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# ECONOMIC GEOGRAPHY

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**NO. 3**

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# ECONOMIC GEOGRAPHY

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## LAND

**L**AND includes many things—the surface of the earth, its relief, its climate, and its resources—water, minerals, plants and animals. To the lawyer it means one thing; to the farmer, another; to the economist something else; to the statesman still another thing; but to the geographer it means the theater for man's activities, the environment that constitutes the stage upon which the great drama of history is enacted. It shapes men's lives, it controls their relationships, it molds their destinies.

All peoples are affected by their lands. The Eskimo may not rise above a hunting culture because the rigors of their land and the paucity and monotony of its resources prevent. The Bedouins must live a nomad life if the herds and flocks that sustain them are to thrive. The Norwegians and the Newfoundlanders must face the fogs and stormy seas of their fishing grounds if their families are to be well fed. The farmer of the Nebraska plains, the Bavarian hills, and the Chosen valleys must till their soil well, or starve. The London merchant, the New York banker, or the Tokio prince are as vitally affected by the weather and the wealth of their lands as the peasants of Normandy, the sailors of Sulu, the fellaheen of Egypt or the herders of Queensland. The land affects them all; they who make the most of its resources, who adapt themselves most successfully to its conditions, will survive and prosper and progress.

The history of the world is written in terms of land almost as much as in terms of peoples. Biblical history began in a garden. The return of the Jews from Egypt to their Judean homeland is a dramatic episode in ancient history. Rome imperialistically extended her rule to the farthest known borders of the earth that the land of the Caesars might be glorified and enriched. Columbus crossed the Atlantic that Spain might revel in the riches of the Orient, and Drake swept the Spanish Armada from the sea that England might rule all the seas and most of the shores they wash. The world war, without doubt conceived in the rapacious human lust for land, dimmed for all time the bright idealism of civilization.

Imperialistic envy, greed, and war must cease. The utilization of land, intelligently and unselfishly, for the utmost good of all the peoples of the earth, friendly participation in exploiting and sharing its resources, and fraternal coöperation in controlling and ameliorating its conditions—these should be the program that the economic geographer presents to the statesmen of the world.

# ECONOMIC GEOGRAPHY

VOL. II

JULY, 1926

No. 3

## THE HANDICAP OF POOR LAND

*Ellsworth Huntington*

Climatologist, Yale University

**H**ISTORY abounds in indications of persistent differences between good land and poor. Do these differences follow definite laws, or do they occur haphazard? If they follow definite laws, these are presumably among the most important pertaining to the science of geography.

The ideal way to attain certainty would be to procure exact data as to the conditions on good land and poor among people in all stages of culture from primitive savages upward. That is impossible at present. Nevertheless, a careful analysis of the differences between good land and poor in a few places is possible. On the basis of such an analysis it is possible to estimate how far the facts in these areas agree with the less exactly known facts elsewhere. The statistics of the United States are excellent for this purpose. The United States comprises the largest and most varied of all areas where a satisfactory and uniform method of gathering statistics is used everywhere.

### THE MEASURES OF LAND VALUE

Man's chief demand upon land is crops. Any combination of soil and relief that yields large or valuable crops with a small amount of labor is highly desirable, and any kind that yields small crops is undesirable. The best measure of the value of a piece of land is the crops which it yields *for a given amount of human effort*, but no one has yet measured human effort on farms of different kinds. Accordingly, for the present the best available measure of whether the farm

land in a given region is good or poor appears to be its selling price. Other things may be cheap in countries like Japan and China, but good rice land soars to prices of five hundred or a thousand dollars per acre. The value depends upon soil, relief, climate, stage of culture, accessibility of markets, and various minor factors which need not be considered. For the present all the others except soil and relief may be eliminated. Climate and stage of culture can be eliminated by using small areas which nevertheless have pronounced differences of soil and relief. Almost all of the states east of the Mississippi contain such areas, so that the effects of climate and stage of culture are largely eliminated when the counties with good and poor land are compared in an individual state.

### ACCESSIBILITY TO MARKETS

Accessibility to markets has far less effect upon the price of land than is usually supposed. This is evident in Fig. 1, which is a map of the average value of farm land in the United States in 1920. The best markets, of course, are found in the largest cities, but those as a rule are not the places where the farm land is most costly. Boston, New York, Los Angeles, and Seattle, to be sure, are surrounded by small patches of heavy shading in Fig. 1. This is doubtless due in part to the fact that farm land close to cities has a value as residence property as well as for farming. But the land around each of these cities, and

especially around Los Angeles and Seattle, is unusually good for crops, so that it would command a relatively high price even if there were no great cities near at hand.

Other great cities are by no means the centers of the darkest shading in their respective areas. Note Philadelphia in its pale patch; Chicago in a dark area, but with a still darker patch one or two hundred miles to the southwest; Cincinnati in a relatively light patch with

that relatively small city. The second largest patch lies in northern Illinois, but the value of the land actually declines toward Chicago.

And note the irrigated patches scattered over the dry western states. Very few are situated near large markets, but all have land of high value. Proximity to markets and to facilities for transportation is evidently a minor factor in determining the value of farm land. Such land is valuable for what it pro-

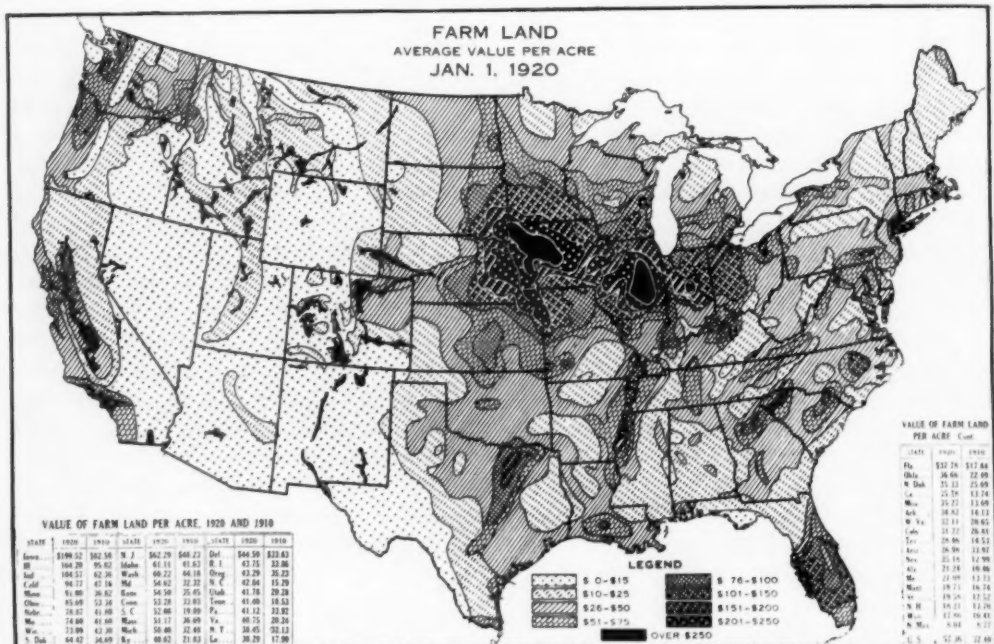


FIGURE 1—The Corn Belt is conspicuous on this map, average land values in central Illinois and northwestern Iowa having risen to over \$250 an acre in 1919. There has been a decline since. The irrigated areas are also shown on the map as having land values of over \$250, but this is not true of all the districts. Even the larger irrigated areas were too small to show other than in black, and many smaller districts could not be shown at all. The regions of low land values are the arid and semi-arid lands of the West, the sandy, thin, or stony soils of the upper Lakes area and the North Atlantic States, and the light or leached lands in parts of the South, where also much of the farm may be in forest. The first box in the legend should read \$0—\$10, the second box \$11—\$25. (Yearbook of the Dept. of Agriculture, 1921.)

dark patches on each side; and St. Louis, Baltimore, Detroit, San Francisco, Milwaukee, St. Paul, Minneapolis, and many other large cities which are not located in the centers of the darkest parts of the map. The largest of all the black patches is in western Iowa, not far from Omaha, but evidently it owes only a small fraction of the value of its land to

duces. The large black patches in Illinois and Iowa are areas where the yield of corn per acre runs steadily high year after year, and where other crops grow correspondingly well. The soil, and to a less degree the relief, are the main reasons for both of these patches, as well as for the local differences of shading in almost every other part of the map.



Abundant other evidence, such as the value of good land in practically all parts of China and Japan, regardless of where the cities are located, seems to prove that nearness to markets is a minor factor in determining the value of farm land. Such land is valuable for what it produces; if it is capable of high productivity it will be provided with all the railroads, or other means of communication that it needs, so far as the stage of culture of the people permits, or at least it will attract enough people to provide its own market. Hence, if we omit the large cities, and compare the counties containing the least valuable land, with those containing the most valuable land in almost any of the states in the eastern half of the United States, we may feel fairly certain that the differences which we find are due largely to the effect of soil and relief upon productivity.

#### COUNTIES SELECTED

We shall confine our study to the eastern half of the United States, not only because the differences of climate, altitude and relief within any given state are relatively slight there compared with farther west, but because that section has been settled long enough to permit the people to shake down, as it were, into a fairly permanent condition. Let us use the ten states of Ohio, Indiana, Illinois, Iowa, and Minnesota in the north, Kentucky and Tennessee in the center, and Georgia, Mississippi and Arkansas in the south. In each state let us choose the fifteen counties where the value of the farm land is highest per acre, and the fifteen where the value is lowest.<sup>1</sup> But we shall omit all counties containing towns of over 10,000 population, as our study is concerned with the rural people, those who are close to the land.<sup>2</sup>

<sup>1</sup> See Table A and Figs. 23 and 24 at end of article.

<sup>2</sup> Because of an error, Monroe County, Indiana, is included among the poor counties of that state, although it contains Bloomington, a town of over 11,000 population. The effect of this is merely to make the poor counties appear better than would otherwise be the case. The mistake was discovered so late that it did not seem worth while to make all the new calculations that its correction would involve.

#### INCOMES

In most respects the contrast between good land and poor is of the same sort in each of our ten states. In a number of cases, however, the southern states with their Negro population differ from the northern, and there are other suggestive departures from uniformity. One of the most uniform features, as might be expected, is the greater income per farm on the good land than on the poor, as appears in the following table:

INCOME PER FARM, 1919

	Good Land	Poor Land	Ratio of Good to Poor
Iowa.....	\$5,945	\$3,480	1.7
Illinois.....	5,710	1,760	3.2
Minnesota....	3,860	1,740	2.2
Ohio.....	3,830	2,180	1.8
Indiana.....	3,460	1,625	2.1
Georgia.....	2,200	805	2.7
Kentucky.....	1,910	785	2.4
Arkansas.....	1,810	1,090	1.7
Tennessee....	1,745	1,155	1.5
Mississippi....	1,370	1,010	1.4

The farm income is found by taking the value of all crops, dairy products, poultry products, and wool per farm in 1919, the year covered by the last census, adding one tenth of the value of the live stock to represent roughly the value of the new animals raised each year in excess of the value of their food, and subtracting the amounts spent for labor, fertilizer, and feed. Even in Mississippi, where the contrast is least marked, the average farmer in the counties with good land gets about \$140 of income for every \$100 received by the farmer on the poor land, while in Illinois the corresponding figures are \$320 against \$100.

Similar conditions prevail almost everywhere. Even the seeming exceptions like Florida are generally the result of the operation of other factors. Fig. 1 shows that the most valuable farm land is located in the peninsula along the central parts of the coast, especially in the west. The relief in those parts is not appreciably more favorable than else-

where, and the soil is not so fertile according to the usual standards. But two other factors must be considered, namely climate and stage of culture. In northern Florida, where the soil is chemically richest, the abundance of autumn rain makes it difficult to raise cotton, the chief money crop in the adjoining states. Killing frosts also make it unprofitable to raise oranges. Moreover, the heavier, although richer soil of the north is not so good for winter vegetables and oranges as is the lighter, warmer, more sandy soil of the central peninsula.

A century or even a half century ago it was of no advantage to Florida to raise

ble to take advantage of the soils hitherto unused and of the climate with its freedom from frost. In this respect, Florida is no exception to our general rule; there, as elsewhere, the land that yields the highest financial return for a given amount of labor is the most valuable; and the social, economic, and racial contrasts between it and the poor land are the same as in the other states. Since other seeming exceptions disappear in the same way, our first tentative generalization is that, other things being equal, the farmers who live on poor land have smaller incomes than their neighbors on good land. If the farmers have small incomes, it is practically certain that the mer-



FIGURE 2—A typical southern mountaineer cabin in Haversham Co., Georgia. In this section of Georgia, where labor is entirely made up of mountain whites, wages of fifty cents a day were paid some years ago at the time this picture was taken. Notice the stony soil. (Photo from U. S. Dept. of Agriculture.)

either oranges or winter vegetables, for there was little market for them. Therefore, the richer soils in the north were more valuable than the sandier lands of the peninsula. But today a new stage of culture has opened, a stage in which transportation is so cheap and easy that a man who raises nothing but oranges may make a very good living, provided he has foresight enough to guard against years of failure. Thus it becomes possi-

chants, artisans, professional men and laborers in the same region also have small incomes, and the standards of living are low.

All this seems so obvious that the reader may wonder why a page or so has been wasted in discovering it. The main reason is that we wish to be sure of our ground. We wish to know not only the kind of handicaps that hamper a man on poor soil, but their magnitude.



FIGURE 3—Farmstead scene showing buildings and farm land in the Valley of Virginia. The same kind of people settled on these fertile limestone lands as in the mountain districts. This prosperous farm is located a few miles from the cabin shown in Figure 20. (Photo from U. S. Dept. of Agriculture.)

#### CAPITAL

The man on poor soil is burdened by many other handicaps. One of these is his lack of capital, and his difficulty in borrowing it. In all of the ten states listed except Georgia, where the rates are practically identical, the farmers on the poor land pay a higher rate of interest on their mortgages than do those in the good counties. Where other causes, such as climate and race, combine with poor soil and rugged relief to depress the value of the land, the rate of interest rises especially high. Thus in these ten states the average rates are as follows: northern rich land 5.54 per cent; northern poor land 6.04; southern rich land 6.80; southern poor land 7.20. The same causes which determine the rates of interest, together with those rates themselves, make it difficult for the farmers on poor land to secure loans on mortgages. Doubtless they would be glad to secure such loans, even more glad than their more fortunate neighbors on good land, but the actual percentage of farms reported as mortgaged runs as follows: northern good land 50; northern poor land 32; southern good land 40; southern poor land 22. The main cause of these differences appears to be the saleability of the land. Other things being equal, the greater the value of the land per acre, the more easily it

can be sold. It is on run-down farms, not New York skyscrapers, that the "For Sale" signs grow mossy.

Accordingly the following figures as to the average value of farm land per acre in the selected counties of the ten states give some idea of the ease with which the farms can be sold: northern rich land \$202; northern poor land \$60; southern rich land \$73; southern poor land \$12. These figures, however, by no means wholly explain the interest rates, for the southern good land is worth more than the northern poor land, but pays higher interest. The relative abundance of capital in the north and the general activity of all kinds of business help to keep the northern rates low, while the fact that colored people carry part of the southern mortgages helps to keep the rates high there.

The speed with which the population is growing is often supposed to have much to do with the rate of interest, but the ten states listed give no support to this idea. From 1910 to 1920 the northern rich counties, where the interest rate is only 5.5, *lost* part of their rural population, while the northern poor counties, where the interest rate is 6.0, *added* to theirs. In the South the opposite conditions prevailed, for the counties with good land gained in population while the poor counties lost. For our present purpose, however, the essential

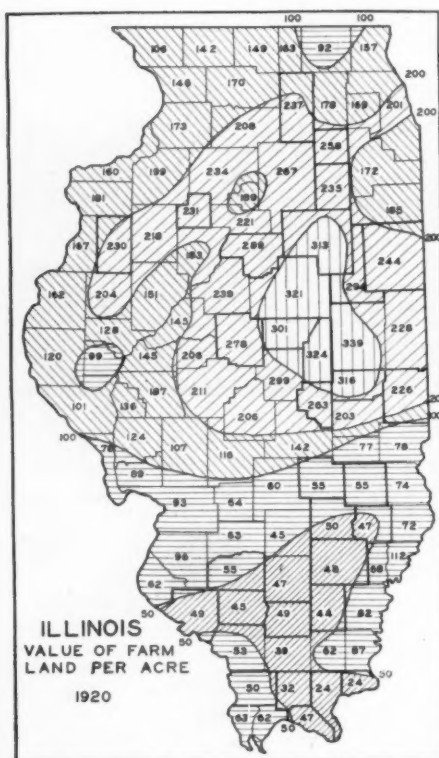


FIGURE 4—The value of farm land per acre is the basic fact in determining the distribution of agricultural and rural conditions in Illinois. It depends mainly on soil, climate and relief. In all the maps of this article dark shading indicates conditions that tend to accompany good land, regardless of whether this means high figures or low. The distribution of land values corresponds closely with that of soils. Highest values are almost confined to regions of most recent glacial till, while the lowest values are found in the unglaciated south.

point is that in practically every state the farmer on poor soil is subject to the handicap of being obliged to pay a relatively high rate of interest if he tries to carry a mortgage.

This same man on poor soil is under the additional handicap of having to pay relatively high prices for almost everything. His house and barns are much poorer than those of his fellow farmer in the same state on good soil, but they cost him much more in proportion to his capital and income. The same is true of implements, even though they are not half so good as those of his more fortunate competitor.

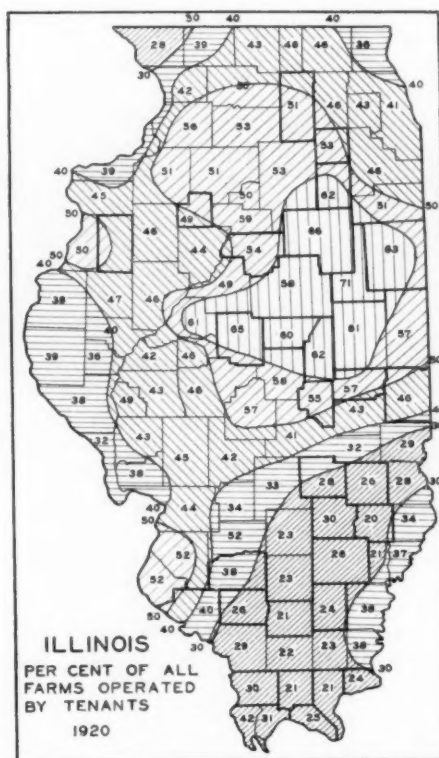


FIGURE 5—The percentage of farms operated by tenants displays the same general pattern as the value of land and farms. Tenancy tends to be highly developed where the soil is highly productive. Only in such places, as a rule, can the soil support absentee landlords as well as farmers.

The figures for the combined value of buildings, machinery and implements expressed as percentages of the values of the farm land are as follows: northern rich land 17.2; northern poor land 33.4; southern rich land 26.8; southern poor land 43.8. It costs to be poor.

#### SPARSITY OF POPULATION

Still another disadvantage which suggests itself in this connection is the sparsity of the population and the scarcity of towns on the poor land. Does this make it difficult to find markets, conduct good schools, obtain medical care, and gain the benefit of contact with the rest of the world? In Minnesota where there are only 7 people per square mile on the poor land compared with 24 on the good, this seems to be the case.



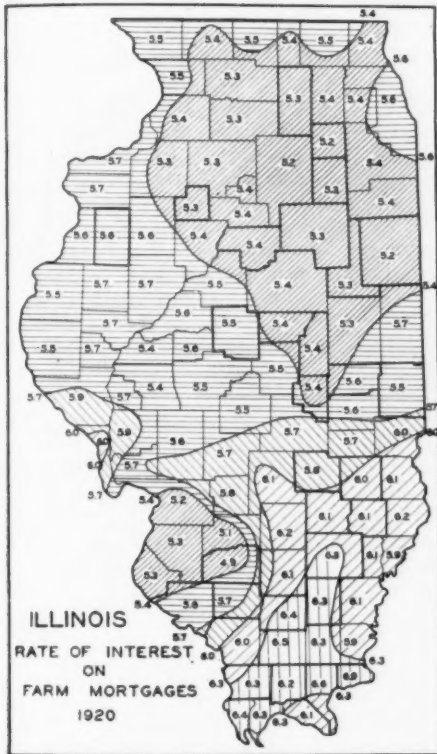


FIGURE 6—The rate of interest on farm mortgages tends to be low where the soil is valuable and high where the soil is poor. This generalization is modified by the fact that cities, with their large supply of capital, are another important factor in determining the rate of interest.

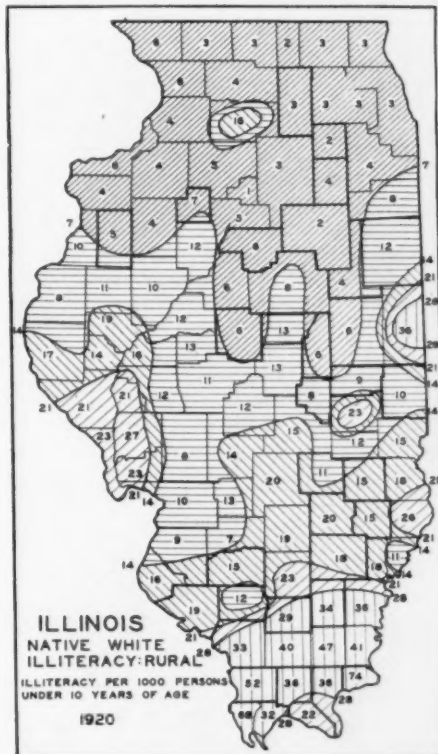


FIGURE 7—Illiteracy depends upon so many factors that its distribution would scarcely be expected to be the same as that of the value of the land. The presence of Chicago and St. Louis tends to improve education in their vicinity even among the rural population. Mining in the south and west central portions of the state tends to bring in an illiterate population. In spite of these factors the general features of the map resemble those of the value of the land.

So, too, in Georgia where the corresponding numbers are 16 and 60, and in the other southern states where smaller contrasts of the same kind prevail. In the north, however, the differences in the density of population on the two kinds of land are very slight, and in Illinois there are more people per square mile on the poor land than on the good. In fact for the four northern states aside from Minnesota the density of population is practically the same on both kinds of land, being 41.5 per square mile on the poor, and 43.2 on the good.

So far as towns are concerned, the good land undoubtedly has an advantage in the south, but this becomes insignificant in the north. Of course we have excluded counties containing towns of over

10,000 people, but even so, the smaller towns of 2,500 to 10,000 people in the south contain only 2 per cent of the inhabitants of the poor counties against 14 per cent for the good; in the five northern states these figures become 16 and 18. Because of their greater prosperity the counties with good land can support more stores, lodges, movies, ministers, physicians, carpenters, teachers and other people of the kinds who live in small towns. In the north, however, in the purely rural communities, this by no means increases the urban population so much as would be expected.

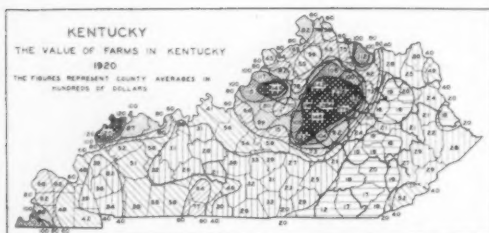


FIGURE 8—The Kentucky series of maps includes slightly different criteria from those used for Illinois. Heavy shading in all maps indicates conditions that tend to go with good land, regardless of whether such tendencies are represented by high figures or low. The Blue Grass region and the western lowlands are areas of most valuable land; the Kentucky Mountains in the east and the Highland Rim in the west contain farms of low value.

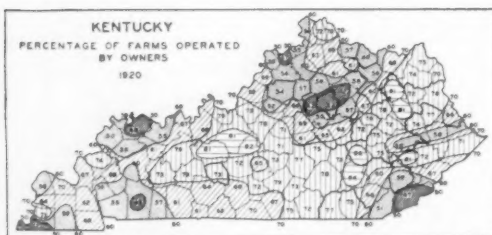


FIGURE 9—The map showing percentage of farms operated by owners (1920) might also be labeled tenancy. Where the shading is heavy the proportion of tenants is large. Kentucky, like other states, generally shows a high degree of tenancy where the land is valuable, and very little where the land is cheap.

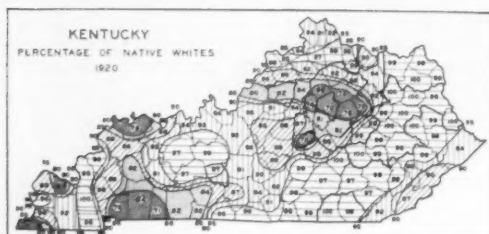


FIGURE 10—Native whites predominate overwhelmingly in the Kentucky Mountains and in the western part of the Highland Rim. In the Blue Grass region and the best parts of the Ohio, Mississippi and Cumberland Valleys, the percentage of whites is lowest, for many negroes have come in from the south.

#### THE CAUSES OF POVERTY

Let us next inquire into the causes of poverty and other disadvantages in the counties with poor land. Is the land alone responsible, or must the people themselves bear part of the blame? Let

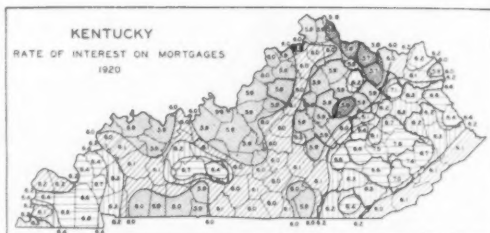


FIGURE 11—In Kentucky, as in Illinois, the rate of interest varies inversely with the value of the land. In the mountains where the land is cheapest it rises to 7.6, while in the center of the Blue Grass region a few score miles away it falls to 5.8.

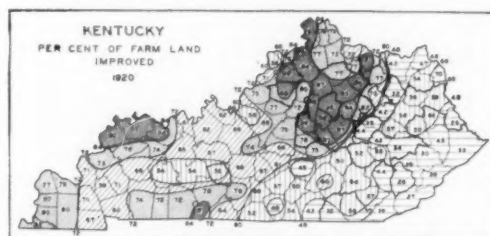


FIGURE 12—The percentage of farm land that is improved has a most intimate relation to the average value of the land and of the farms. The range is from 26 per cent in the Appalachian Mountains to 96 per cent in the Blue Grass region.

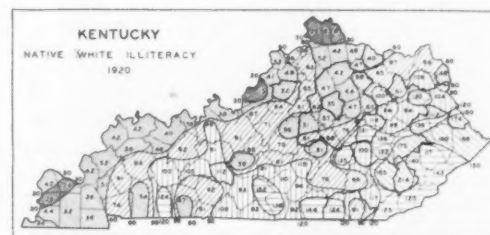


FIGURE 13—In Kentucky, as in Illinois, there seems to be a strong tendency for illiteracy to increase from north to south. There is, however, a tendency for good land such as that of the Blue Grass region to have only a few illiterates. In the mountains the spotted appearance of the map suggests the recent invasion of education.

us see, for example, whether the racial character of the inhabitants has anything to do with the matter.

#### Race

Do native whites, foreign-born immigrants and negroes show any special predilection for one type of land or the other? Taking all the northern states together the percentages of native whites on the two kinds of land are almost

identical, averaging between 91 and 92 in both cases. Such a high figure is normal, for purely rural communities generally contain a large percentage of native-born in practically all parts of the United States. The foreign-born farmers amount to about 7.5 per cent on both the good and the poor land of the North. The Negroes are negligible there, amounting at most to 2 per cent in the poorer part of Ohio. Evidently there is no systematic tendency for either natives or foreigners to predominate on either kind of land in the North, and the differences in the prosperity and progressiveness of the two sets of counties can scarcely be attributed to race.

In the five southern states the native whites form 64 per cent of the population on the good land and 79 on the poor, the

contrasted prosperity of the farmers on the good land and the poor. The good land, however, does cause a concentration of Negroes, and that in itself is a highly important fact.

#### *Individual Efforts*

Let us next inquire whether the farmers in poor regions put forth any special efforts in order to raise their standards to those of their fellow citizens on the good land. In other words, does the poverty of the land stimulate thrift, industry, and other good qualities, as is often supposed? Four methods, each of which can be tested statistically, might be used to raise the standards on the poor land to the level of those on the good; the farmers on poor land might (1) enlarge their farms, (2) work harder than their



FIGURE 14—A new farmstead in Grundy County, a region of good land in Iowa. Note the small windbreak. (Photo from U. S. Dept. of Agriculture.)

remainder of the population being practically all Negroes. The fact that 35 per cent of the population on the good land is colored, and only 20 per cent on the poor, must tend to diminish rather than increase the economic contrast between the two kinds of land. Since the colored people ordinarily have low incomes, their presence in large numbers must work to the disadvantage of the counties with good land in the South. Hence, it seems clear that the racial composition of the population is in no sense a cause of the

neighbors on better land, (3) employ greater intelligence, and (4) restrict their families. It seems as though persons of high intelligence, or even of moderate intelligence ought to adopt all four methods.

#### *Size of Farms*

Do the farmers on poor land enlarge their farms in order to produce as much as do their rivals on the good land? By no means. In the five northern states of our comparison the farms on the poor



FIGURE 15—A typical residence in the Wenatchee orchard region of Washington. These fruit farms are small in area but large in capital invested, and it is the capital invested which normally determines the income. (Photo from U. S. Dept. of Agriculture.)

land systematically average smaller than the others, no matter whether we consider the entire farms or the improved part that is under cultivation. In Illinois, Iowa, and Minnesota where most of the land was originally parcelled out in quarter sections of 160 acres each, the average size of the farms in the good areas in 1920 was 164, 174, and 184 acres against 112, 151 and 154 in the poor areas. This means that the farmers on the good land tend to increase their holdings, while those on the poorer land have sold part of what they originally acquired.

This tendency becomes still more significant when one considers that on an average about 89 per cent of the good soil is improved, and only 68 per cent of the poor. One must also remember that the farmers on the good land produce more per acre than do those on the poor land, the average values of crops per acre in 1919 being \$33.90 on the good land of the five northern states and \$21.30 on the poor.

If the farmers on the poor land were to enlarge their farms so as to get the same return per farm as do the farmers on the good, the average size of their farms in the five northern states would have to be 297 acres in comparison with 143 for the

farms on good land. Actually the average size of the farms on poor land is only 120 acres.

In the South the average farm on poor land is larger than on good, but this is merely because a large part of the best land is rented to colored farmers who are content with small farms because their standards of living (and working) are low. In the North the owner of a big farm frequently runs it himself by means of hired help. A similar owner in the South rarely does much farming. He rents his land to tenants, mainly colored, and devotes his attention to supervision. Although exact data are not available, it is certain that so far as *ownership* is concerned the contrast between the good and poor lands is of the same kind in the South as in the North. A small white aristocracy still owns most of the land in the best farming regions of the South.

Thus neither in the North or South is there any evidence that the farmers on the poor land make up for the lack of productivity of their land by cultivating or owning a larger area than do the farmers on the good land. The opposite is emphatically the case. On the poor land the farms tend to decrease in size; on the good land they increase.



*Intensive Cultivation*

Do the farmers on the poor land make up for the handicap of their soil by more intensive cultivation? An approximate answer to this is found in the amount of labor per acre performed by men and horses. In the absence of exact data let us assume that a man or a horse works equally hard on both kinds of land. The average value of the horses on the good land of the five northern states, to be sure, is \$97 against \$89 on the poor, and in the five southern states \$105 against \$101. For mules the corresponding figures are \$124 and \$111 in the North and \$161 and \$139 in the South. Incidentally it may be added that so far as the figures have been tabulated, the cattle and swine on the rich farms are also worth more per head than on the poor farms, but sheep and chickens are worth nearly the same sum on both kinds of land.

Presumably the more valuable horses and mules do better work than the less valuable ones, but that is merely conjecture. It is certain, however, that the number of horses and mules per acre of improved land is almost everywhere greater on the good land than on the poor, the only exception being Iowa and Minnesota where the amount of farm machinery is at a maximum. The average number of horses and mules per 100 acres of improved land in all our ten states is 5.2 on the good land and 4.7 on the poor.

Do the people on the poor land make up for this deficiency in work animals by working harder themselves? Let us assume that on both kinds of land the farmer's own family including himself, provides work amounting to a man and a half for the eight months during which there is much work to be done. As a matter of fact the number of children per family is greater on the poor land than on the good. Moreover, the older boys are perhaps less likely to go away to school or to become clerks in the grocery at the "Corner." Thus the

families on the poor land probably provide more days of labor per year than do their more fortunate neighbors.

Let us add to the work done by the family the amount of labor hired from outside as calculated from the amount spent for this purpose according to the census. We will assume that the rate paid per month is the same in all parts of each state, although it is actually lower in the poor parts. Reckoned in this way each acre of improved land on the farms of the good counties gets 5.5 days of work during the year, while each acre on the poor farms gets 6.5. Inasmuch as we have consistently given the poorer counties the benefit of the doubt, and inasmuch as the work done by animals is greater on the good land than on the poor, the actual amount of labor per acre of cultivated land is probably about the same in both cases. There certainly is no evidence that the total amount of work per person on the poor farm is any greater than on the good. Even if each acre of improved poor land gets 6.5 days of work per year, as compared with 5.5 on the good land, the average number of improved acres per farm where the soil is poor is only 65 acres, in contrast with 78 where the soil is good. It appears that the farmers do not work so hard on the poor land as on the good.

*Intelligence*

How about the intelligence with which the farms on the two kinds of land are run? This may possibly be indicated by the amount spent for fertilizer. Here at first sight we seem to find a case where the farmers on the poor land go ahead of the others. In 1919 they spent 38 cents per acre on artificial fertilizers, whereas the farmers on the good land spent only 36 cents.

But this difference is trivial, and would be reversed if we omitted Georgia where the expenditure for fertilizer, mainly on cotton land, is far greater than in any other state. Moreover, the value of the livestock per improved acre amounts to

\$16.23 on the good land compared with \$12.73 on the poor. This difference is considerably greater than the corresponding difference in the value of the animals per head. Moreover, on good land the animals are generally stall-fed more frequently than on poor land where the proportion of pasture is large. Both of these conditions indicate a greater supply of manure per acre on good land than on poor. Thus, so far as fertilizers are concerned, the two kinds of farms are almost on a par.

Another test of the intelligence of the farmers is found perhaps in the extent to which implements and machinery are employed. In this respect the farmers on the good land everywhere notably stand ahead. Even if we reckon on the basis of the value of machinery per acre of improved land the averages are \$8.32 on the good land of all ten states against \$5.55 on the poor. There seems to be no way, at least no statistical way, of determining whether the difference in the use of machinery is due to the intelligence of the farmers or to their financial status as determined by the soil. But at any rate the use of machinery agrees with the size of the farms, with the amount of labor and with the use of fertilizers in failing to afford any evidence that the farmers on the poor land employ special methods to increase their production and thus diminish the gap between themselves and their neighbors.

#### *Birth Control*

Even if the farmers on the poor land do not use methods which raise their production toward the level of their neighbors on the good land, do they not at least have the wisdom to limit the size of their families and thus maintain high standards of living? On which type of land would you expect the families to be larger? On the poor land, almost everyone answers. That is correct. But why assume that the people on poor land have larger families than those on good land? Does not this assumption carry with it the implication

that the people on the poor land are relatively lacking in foresight, thrift, or self control? If they were wise, would they not restrict their families after the French fashion so that each family could pass on a good "dot" to its one girl and a farm to the boy?

In extenuation of their course it may be said that many children are a help to the farmer, but that is true only so long as plenty of land is available so that as the families increase in size the amount of hired labor can be diminished, or the size of the farms increased. But there is practically no hired help on the poorer farms and the stage when new land can profitably and easily be put under cultivation is long past in practically all parts of the ten selected states, with the exception of northern Minnesota and possibly of north-central Arkansas, both of which are regions of poor land.

If the average income per farmer and the average size of the family are used as a means of locating a point for each of our twenty groups of counties on what is known as a dot chart, one sees at once that practically all the dots indicating an income of less than \$2,200 lie not far from a straight line. This means that except in unusual cases the number of children per family decreases systematically as the income of the farmers rises. Contrary to what is usually supposed there is no indication of larger families among the Negroes than among the whites. The Kentucky Mountains have the largest families (5.1) and lowest incomes (\$785) among the whole of our twenty groups of counties, but there the people are almost purely native whites with only one per cent of Negroes. In the good counties of Mississippi, on the contrary, where the percentage of Negroes rises to 62, the size of the families (4.3) is less than would be expected from the general trend of the other dots. Possibly this may be due in part to a high death-rate and in part to the migration of colored people to the North during the war.

When the income exceeds \$2,500, ac-

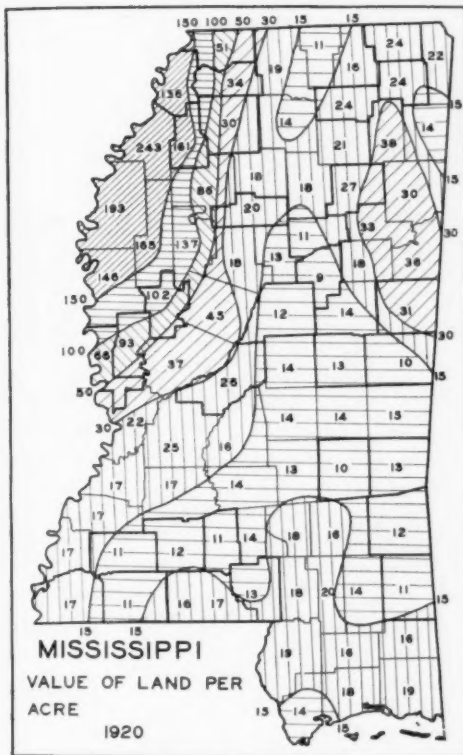


FIGURE 16—The value of land per acre in Mississippi ranges from \$10 in the center to over \$150 in the Mississippi bottom lands of the northwest. Soil and topography are important factors in determining these values.

cording to the exaggerated scale of 1919, a distinct change occurs. The size of the families diminishes much more slowly than before in proportion to the increase in income. By the time the income reaches \$5,000 on the 1919 scale the decrease has given place to an increase, and as \$6,000 is approached the farmers in the best parts of Illinois and Iowa have families as large as those where the income is about \$1,800.

All this suggests that as the income becomes larger, the number of children actually begins to increase. This would be a most hopeful sign if it were true. Unfortunately the word "family," as used by the census, includes servants, boarders, and anybody else who happens to live in a house and take his meals there. It takes no account of the children who have gone away from home.

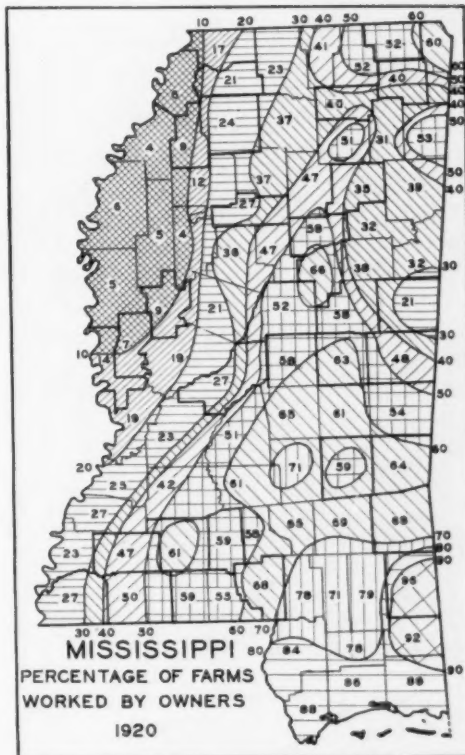


FIGURE 17—The distribution of owners versus tenants, like the distribution of whites and negroes, depends upon the value of the land. Where the land is best only 5 or 10 per cent of the farmers work their own land. Where the land is poorest 80 or 90 per cent till the land with their own hands.

Thus while we know with great exactness how many pigs are born to a litter in any given section of the United States, the census gives us no idea as to the actual size of real families. It seems as if we ought to know as much about parents and their children as about sows and their pigs. Fortunately the Census Bureau is now collecting data which partially supply the necessary facts.

To return to our main theme, among farmers with an income too small to allow the employment of servants the census family and the real family are practically identical, except as the young people go away from home. When the income reaches a certain size hired "help" is kept, and that makes the census families appear to be less restricted than is actually the case. Thus

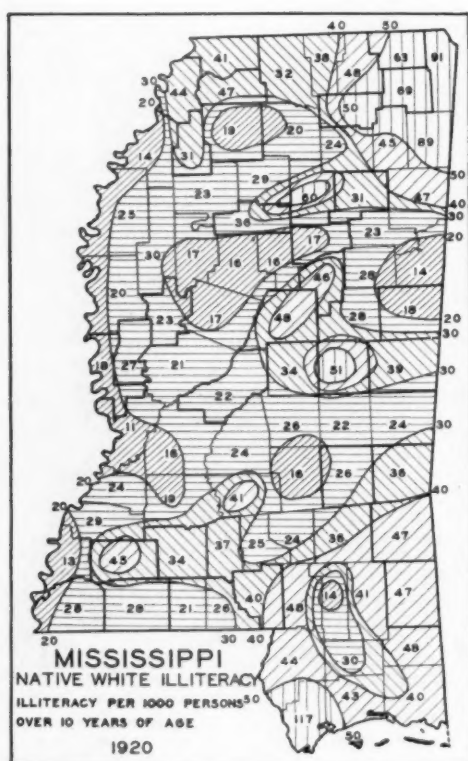


FIGURE 18—The maps of illiteracy are so irregular that no very definite conclusion can be drawn from them. Nevertheless on the valuable land along the Mississippi and in the Black Belt, the white people in general show a low degree of illiteracy, while the colored people show a relatively high degree, according to their standards. On the poor lands the reverse is true in spite of great irregularity.

what our data really show is that among farmers, as among other people, the number of children diminishes in almost perfect harmony with the increase in income. And the income depends directly upon the quality of the land. The poorer the land the greater the number of children. This suggests a very distinct inferiority on the part of the poorer farmers. They apparently permit themselves to have large families even though they know that the children will be a burden and cannot be well educated or well provided for.

#### OWNERSHIP AND TENANCY

Further indications along this same line are afforded by the degree to

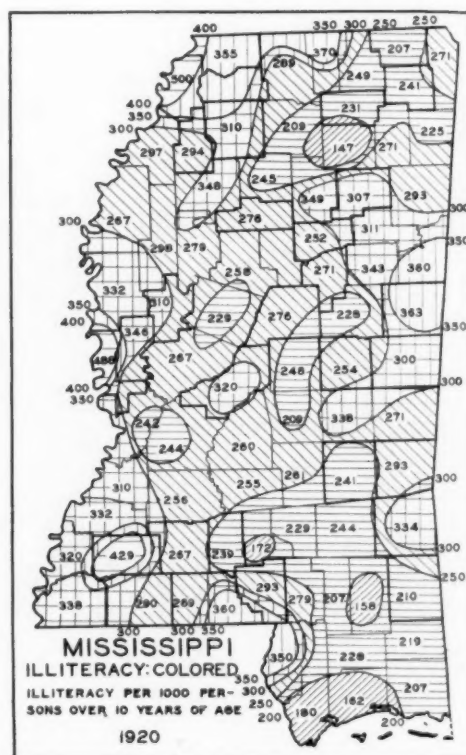


FIGURE 19—The relationship which occurs in Mississippi of well educated whites and ignorant colored on the good land versus ignorant whites, and relatively well educated colored people on the poor land is found repeatedly in other states.

which the farmers own their own farms. Here our data show great uniformity. With the single exception of the Negroes of Tennessee, the percentage of farmers who operate their own farms is smaller—often much smaller—where the land is good than where it is poor. This is true no matter whether we deal with white people, colored people, or foreign immigrants.

On good land some of the farmers save enough so that they can afford to rent their farms and retire to villages; or they prosper so much that they buy farms in addition to their own. As old age approaches they perhaps rent one of the farms. They can do this easily, for their good land is in demand. Where the land is poor, few farmers are able to lay up enough to purchase new land, and it is relatively difficult to find tenants for poor



farms. Moreover, there appears to be a stronger tendency for the young people to move to the towns from the good land than from the poor. The fact that many such young people inherit farms which are rented to tenants helps them greatly in establishing themselves in business or in going into professions. But regardless of just how it happens, one of the most basic facts about farming all over the world is that on good land the percentage of tenancy tends to be high.

Certain kinds of tenancy are advantageous. A son may be his father's tenant; an immigrant, or the ambitious native son of poor parents may rent a farm which he ultimately buys. As a matter of fact, however, such tenants are a small minority. The majority, and in some places an overwhelming majority, as in the better farming regions of the South, are tenants who never get beyond the stage of tenancy. Thus a high percentage of tenancy is generally a bad sign. It indicates a large proportion of relatively incompetent people who are not capable of possessing the land themselves, and who tend to be careless in their methods of cultivation.

But it also indicates something of the opposite sort. In spite of individual exceptions, the people who own farms and rent them to others are generally above the average in ability. Such ability in themselves or in their families is one of the main reasons why they own land. In many cases they are able to lease farms to others because they have succeeded so well that they own more land than they care to cultivate, or else are able to make a living in less arduous, more interesting, or more profitable ways than farming. The lawyer in the small town, the merchant who runs the post-office, the local judge, the congressman, and the college professor who grew up on the farm are often among the owners who rent their farms to tenants.

Thus tenancy means a division of the population into a relatively prosperous land-owning group and a much less prosperous group of tenants. In the north-

ern states, and especially in those that are newer, this division has not progressed far and the two groups are not socially separated. In the South the division has gone so far that we may speak of a white aristocracy in contrast with a peasantry. This peasantry consists mainly of Negroes, but also contains an appreciable number of "poor whites" who have not made the grade, so to speak, and



FIGURE 20—A dwelling and family at Frazier Mission Home, Virginia. Some of these mountaineers who have left for better farming regions or the cities have become successful farmers and noted financiers. It is probably adverse environment even more than innate character which dooms the Appalachian mountaineer to poverty. (Photo from U. S. Dept. of Agriculture)

hence have dropped to an almost permanent position of inferiority.

Among foreign-born white immigrants, the percentage of tenants is less than among either native whites or Negroes. Moreover, the farms owned by the foreign-born average higher in value than those belonging to either of the other groups. Perhaps this is because it requires unusual initiative and vigor for a foreign immigrant to leave the city and settle on an American farm. In each of the ten states where the numbers are large enough to be significant, the percentage of tenants is least among the foreign-born and greatest among the Negroes. The average percentages of tenant farmers for all ten states are as follows:

	Negroes	Native Whites	Foreign-born
Good Land...	73.3	47.7	32.2
Poor Land...	55.1	26.5	8.9

## MIGRATION

But even if there are more tenants on good land than on poor, what of it? Does that fact have any effect in attracting or repelling any special kinds of people? It probably tends to make the farmers on the poor land intermediate between the land-owning group and the tenants on the good land. A man who is not quite able to buy a farm where the soil is very rich, but who is independent enough to wish to be his own master, is likely to move to a place where he can afford to buy a farm. That, of course, is more likely to be in a county with poor land than in one where the land is unusually good. How great an effect such

Surprising as it may seem, the percentage of the native born inhabitants who have moved away is greatest in the states *west* of the Mississippi. The states where this percentage rises above 35 are Nevada 53, Wyoming 40, Kansas 37, Iowa 36, and Vermont 38.

No data are available as to how many people have moved to other counties in their own states. If we had data for such movements, we should probably find that in a state like Iowa perhaps two thirds of all the people move away from their birthplaces. This means that a tremendous process of sifting is going on whereby people are shuffled around and finally settle in regions which in one



FIGURE 21—Washed hillside near Cedartown, Georgia. Both the steep slopes of the land and the character of the soil show that the land should never have been cleared. (Photo from U. S. Dept. of Agriculture.)

conditions have upon the character of the population it is impossible to say, but the amount of movement from county to county or state to state is much larger than is often realized.

This is especially true while a region is being settled. The United States Census shows how many people move away from the state where they were born.

way or another are adapted to their temperaments or capacities. The importance of this shuffling can scarcely be over-rated.

## SUMMARY OF ECONOMIC CONDITIONS

Let us sum up what the census reveals as to the economic condition of the people on good land compared with poor. The

average farmer in counties with good land invariably has a much larger income than does the average farmer on poor land in the same state. We infer with considerable certainty that the same is true of the other people who live in these two types of districts. The farmers on the good land also systematically excel the others in the size of their farms, or of the average area belonging to a single individual. A similar superiority appears in the value, number, and quality of the farm animals, and in the number of work animals in proportion to the area to be cultivated. The farmers on the good soil likewise have a great advantage because in proportion to their capital they are obliged to spend much less than the others for houses, and implements, while their rate of interest on mortgages and the percentage of the value of their farms represented by mortgages are relatively low. Again, the density of population in towns, and presumably the conditions of markets, banks, railroads, and the like are better where the land is rich than where it is poor.

In spite of all this, the size of families is greater on the poor land than on the good, and diminishes with increasing prosperity, just as occurs among people of corresponding classes elsewhere. The only serious condition in which the rich land seems to be at a disadvantage compared with the poor is the high degree of tenancy. None of these differences seems to be due to the racial composition of the farmers, even though the Negroes tend to congregate on the good lands of the South.

#### THE HUMAN FACTOR

The question that next confronts us is how far is all this due to the economic and sociological conditions arising directly from the soil, and how far to the innate quality of the people. Some of the facts given above suggest inferiority among the people on the poor land. Is there any truth in this?

#### LITERACY

The facts as to foreign born immigrants and as to persons in *Who's Who* afford a partial answer to this question. They suggest that the kind of people who settle in any given region does not depend upon the laws of chance but upon a definite selective principle. The figures for illiteracy in the two groups of counties with good land or poor are as follows:

#### PERCENTAGE OF ILLITERACY AMONG

		<i>Native Whites</i>	
		A	B
		Good Land	Poor Land
North.....		0.97	1.79
South.....		5.52	7.73
		<i>Negroes</i>	
		C	D
		Good Land	Poor Land
North.....		9.54	12.44
South.....		28.22	27.75
		<i>Foreign-born Whites</i>	
		E	F
		Good Land	Poor Land
North.....		5.05	8.15
South.....		8.28	7.98

The figures for native whites and for northern Negroes are just as we should expect—low on the good land, higher on the poor. But they throw little or no light on the problem of whether the people on poor land are inherently less competent than those on good land. Illiteracy, so most people would say, is more common on the poor land than on the good, because the poverty of the soil restricts the opportunities of the people who dwell upon it. Among the southern Negroes, however, those living on the poor soil are a trifle better educated than those on the good.

If sauce for the goose is sauce for the gander, the reverse seemingly ought to be the case. If poverty, poor roads, poor schools, sparse population and stifled ambition are really the main reasons why the whites are more illiterate on the poor land than on the good, as is commonly supposed, should not similar conditions in intensified form also make

the colored people more illiterate on the poor land? Yet the opposite is the case.

It is sometimes said that where the colored people are a small minority, as in the poor counties, their greater contact with the whites tends to diminish differences between them and the dominant race. Undoubtedly there is much truth in this. Where aliens are few and scattered, they tend to become like the people around them; where many aliens live together, they preserve their old characteristics. Nevertheless another factor may be equally important. The poor lands of the South have often been a place of refuge for Negroes. In the days of slavery the ambitious freedman could rarely afford to buy land in the rich parts of the South, even if he were permitted to do so. In the poor regions, however, land was cheap and abundant, and the population was sparse until after the Civil War. Of course, the poor whites disliked the thought of competition with the Negroes. Nevertheless, some freedmen settled among them in regions where the land was poor and cheap and the white population sparse and ignorant. Those freedmen were on the whole an especially fine type. Rarely could any others win freedom. Moreover, when once they were free, it required courage and initiative to settle in new regions where the sparse inhabitants were none too friendly.

Somewhat similar conditions still prevail. Negroes rarely buy farms where the soil is especially good. Those who till such soil are mainly tenants of the white man. But a Negro with thrift and initiative wants a farm of his own. Therefore the enterprising tenant is likely to move to some place where the land is cheap enough for him to buy it. Naturally he goes from the richer soil to the poorer, thus bringing to the poorer soil a selected type of Negro. Such people are better educated than their less ambitious neighbors who stay on the rich soil, and their children tend to follow in their steps. The relative superiority of the colored people on the poor soil may be

due to this cause quite as much as to contact with the whites.

Among the foreign-born whites the conditions are the same as among the Negroes—greater illiteracy on the poor land in the North and on the good in the South. In the North, where most of the foreign-born are found, the relative illiteracy of the foreign-born whites on the poor soil has little or nothing to do with local opportunities. Only a handful of immigrants settle on the farms as children. The vast majority come as adults, whose degree of literacy depends on their childhood environment. Some process apparently sorts out a relatively illiterate type to settle on the farms where the land is poor. Of course the sorting is very haphazard and incomplete, but that does not alter the general fact.

This is the way it seems to work: the competent immigrant tends not only to be better educated than the incompetent; but to save more money. When he gets ready to buy a farm, he chooses a better one than does his less competent and more ignorant fellow countryman. Needless to say, the more expensive farms are located where the land is fertile. Even if a competent and industrious immigrant happens to settle on a poor farm, he is almost certain to prosper more than does his incompetent and illiterate neighbor. If he moves to a new farm, as often happens, the chances are that it will be better than his old one. The incompetent immigrant, on the contrary, who is also likely to be illiterate, can rarely afford a good farm. If he attempts to purchase one, he frequently gets into debt, fails to pay on his mortgage, and ultimately may have to move to a farm that is cheaper.

In the table given above it will be noticed that in the South the six thousand immigrants on good soil are a trifle more illiterate than the two thousand on poor soil. The numbers in both cases are too small to be of much significance and the difference in illiteracy is negligible. Nevertheless, it is interesting to see that the immigrants, as might be expected, behave in the same way as



the Negroes. This is presumably because social conditions put the foreign-born farmer in a position where he is not attracted to the good land. The intelligent immigrant avoids districts where he must compete with Negroes. The more intelligent he is, the more likely he is to shun the regions of good soil and numerous Negroes, unless he can at once afford to become an employer or landlord. Thus among the foreign-born farmers of both the North and the South, there seems to be evidence of a process of selection which brings one kind of farmer to land that is good and another to land that is poor. The type of farmer which selects each place depends upon social conditions such as slavery, tenancy, and the relative position of the white and colored races, but the distribution of the social conditions in turn is due largely to the geographic environment.

## EMINENCE

This same process of migration and selection is well illustrated by the people in *Who's Who*. That volume, as most people know, states where some 25,000 of the more competent people of the United States now live and where they were born. The following table shows how 172 of these persons, who happen to live in the twenty groups of counties used in this study, are distributed per hundred thousand of the population.

PERSONS IN *WHO'S WHO* PER HUNDRED THOUSAND INHABITANTS

	Good Land	Poor Land
Ohio.....	3.6	2.2
Indiana <sup>a</sup> .....	5.1	3.7
Illinois.....	3.4	2.0
Iowa.....	11.0	2.9
Minnesota.....	0.4	2.2
Total North.....	4.6	2.5
	Good Land	Poor Land
Kentucky.....	11.6	1.1
Tennessee.....	4.7	1.8
Georgia.....	4.2	0.0
Mississippi.....	1.3	0.8
Arkansas.....	1.0	0.5
Total South.....	4.2	1.9

<sup>a</sup> In the present tabulation Monroe County, Indiana, has been omitted so that the counties

In nine states out of ten the figures for the good land are larger than for the poor. In Minnesota alone is the preponderance the other way. But the good counties there have only one person in *Who's Who* and the poor only five, so that the exceptional character of that state is presumably a mere accident. Perhaps there is some special reason why competent people leave the good land in Minnesota. At any rate ten persons who were born in the good counties of that state live in other counties of the same state, while only one person born in the poor counties lives in some other part of the state. Thus, other things being equal, the proportion of eminent residents appears to be regularly larger on good land than on poor.

But we wish to know whether this condition arises because of the greater opportunities of the good land or because these same opportunities attract a gifted type of people who give the good land an hereditary advantage, so to speak. The answer lies in the following classification of the birthplaces of the persons in *Who's Who*:

PERSONS IN *WHO'S WHO* PER MILLION INHABITANTS IN COUNTIES WITH GOOD VERSUS POOR SOIL

	Northern States	
	Good Land	Poor Land
Home County.....	9	5
Rest of Home State.....	15	9
Other States.....	22	11
	Southern States	
	Good Land	Poor Land
Home County.....	6	2
Rest of Home State.....	13	3
Other States.....	19	3

The first line shows that the good land in proportion to the population excels the poor land two- or three-fold in giving birth to eminent persons who later reside in the counties of their birth. That may be either because the people in the good counties are actually superior to those in the others, or because they have better opportunities. The other two lines tell a different tale. They show that the good

conform exactly to our rule of omitting all which contain towns of over 10,000. See previous note on page 337.



FIGURE 22—An abandoned church on the sand plains of Michigan, a monument to man's folly in trying to farm poor sandy land. (Photo from U. S. Dept. of Agriculture.)

land has from two to six times as much power to attract people from other counties and other states as has the neighboring poor land. This would be still more evident if we were to use counties containing towns of over 10,000 population, for gifted people gravitate toward the towns, and the towns are larger and more numerous on the good land than on the poor. But it is better to understate the case than to overstate it.

This discussion of *Who's Who* although based on only a few people, is confirmed by thousands more used in other tabulations. It indicates that when people migrate to new homes the competent are much more likely to settle on good land than on poor. Of course they are still more likely to go to cities, but that is another question. The people in *Who's Who* are not essentially different from the rest of us. If they tend to go anywhere in large proportions, people of slightly less ability doubtless do likewise.

Thus it goes, down the line, until we come to the immigrant farmers. Of them we have positive evidence that they do exactly as do the people in *Who's Who*. Some of the more competent undoubtedly settle on poor land, but a larger percentage go to good land. Hence

the average caliber of the new-comers tends to be higher on good land than on poor, at least in the earlier stages of development. Only when tenancy becomes so well established that the tenants form an inferior class like the Negroes, is there much likelihood that this general tendency will be checked through its conflict with still stronger tendencies.

Moreover, the ability of the parents tends to be handed down from generation to generation both by physical inheritance and by training. Thus the contrast between the scanty incomes on the poor land and the good incomes on the good land appears to be due not only to the direct economic and social effect of the land, but to the biological types which unconsciously sort themselves out as settlers in one place or the other.

This appears to be true not only in diverse parts of the United States, but also in other parts of the world. The conditions in China, India, Turkey, Germany, France, England, Mexico and many other countries parallel those in the United States so closely in this respect that there seems good reason to believe that we are dealing with an almost universal principle.

# THE HANDICAP OF POOR LAND

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TABLE A  
STATES AND COUNTIES USED IN THE STUDY ENTITLED, "THE HANDICAP OF POOR LAND"

OHIO	INDIANA	ILLINOIS	IOWA	MINNESOTA
<i>A. Good Land</i>	<i>A. Good Land</i>	<i>A. Good Land</i>	<i>A. Good Land</i>	<i>A. Good Land</i>
Auglaize	Benton	De Kalb	Buena Vista	Carver
Clinton	Boone	De Witt	Calhoun	Cottonwood
Fayette	Carroll	Douglas	Carroll	Freeborn
Fulton	Fountain	Edgar	Cherokee	Jackson
Hardin	Hamilton	Ford	Greene	Lac qui parle
Henry	Hancock	Grundy	Hamilton	Le Sueur
Madison	Hendricks	Iroquois	Humboldt	Lyon
Mercer	Johnson	Kendall	Ida	McLeod
Ottawa	Newton	Livingston	Lyon	Martin
Paulding	Randolph	Logan	O'Brien	Murray
Pickaway	Rush	Moultrie	Pocahontas	Nobles
Preble	Tipton	Piatt	Sac	Pipestone
Putnam	Warren	Stark	Shelby	Redwood
Van Wert	Wells	Warren	Sioux	Rock
Wood	White	Woodford	Story	Watonswan
<i>B. Poor Land</i>	<i>B. Poor Land</i>	<i>B. Poor Land</i>	<i>B. Poor Land</i>	<i>B. Poor Land</i>
Adams	Brown	Clay	Allamakee	Aitkin
Brown	Crawford	Efingham	Appenoose	Becker
Carroll	Dearborn	Franklin	Bremer	Beltrami
Clermont	Dubois	Hamilton	Chickasaw	Benton
Gallia	Harrison	Hardin	Clarke	Carlton
Geauga	Jennings	Jasper	Clayton	Cass
Harrison	Martin	Johnson	Davis	Clearwater
Hocking	Monroe	Massac	Decatur	Cook
Jackson	Ohio	Perry	Fayette	Crow Wing
Monroe	Orange	Pope	Howard	Hubbard
Morgan	Perry	Randolph	Jackson	Itasca
Noble	Pike	Richland	Lucas	Koochiching
Perry	Ripley	Union	Ringgold	Lake
Pike	Switzerland	Washington	Van Buren	Pennington
Vinton	Washington	Wayne	Winneshiek	Roseau
KENTUCKY	TENNESSEE	GEORGIA	MISSISSIPPI	ARKANSAS
<i>A. Good Land</i>	<i>A. Good Land</i>	<i>A. Good Land</i>	<i>A. Good Land</i>	<i>A. Good Land</i>
Bourbon	Bedford	Barrow	Alcorn	Arkansas
Boyle	Crockett	Clayton	Chickasaw	Chicot
Clark	Dyer	Cobb	Desoto	Clay
Fulton	Gibson	Fayette	Grenada	Crittenden
Garrard	Hamblen	Franklin	Humphrey	Cross
Harrison	Lake	Gwinnett	Issaquena	Desha
Jessamine	Lauderdale	Habersham	Madison	Greene
Madison	Marshall	Henry	Noxubee	Jackson
Mason	Maury	Jackson	Panola	Lee
Mercer	Obion	Madison	Prentiss	Lonoke
Montgomery	Smith	Morgan	Quitman	Monroe
Nicholas	Sullivan	Oconee	Sharkey	Poinsett
Scott	Sumner	Oglethorpe	Tate	St. Francis
Shelby	Trousdale	Spalding	Tunica	Sebastian
Woodford	Washington	Walton	Union	Woodruff
<i>B. Poor Land</i>	<i>B. Poor Land</i>	<i>B. Poor Land</i>	<i>B. Poor Land</i>	<i>B. Poor Land</i>
Breathitt	Benton	Bryan	Amite	Baxter
Edmonson	Chester	Camden	Attala	Bradley
Elliott	Cumberland	Charlton	Choctaw	Calhoun
Jackson	Decatur	Chattahoochee	Clarke	Cleburne
Lawrence	Fentress	Clinch	Franklin	Fulton
Lee	Grundy	Echols	Greene	Izard
Leslie	Hardeman	Fannin	Jasper	Madison
McCrearie	Henderson	Gilmer	Kemper	Montgomery
Martin	Houston	Lumpkin	Lawrence	Newton
Menifee	Lewis	MacIntosh	Lincoln	Ouachita
Morgan	McNairy	Quitman	Marion	Searcy
Owsley	Morgan	Talbot	Neshoba	Sharp
Rowan	Pickett	Union	Wayne	Stone
Whitley	Scott	Wayne	Webster	Union
Wolfe	Van Buren	Wilkinson	Wilkinson	Van Buren

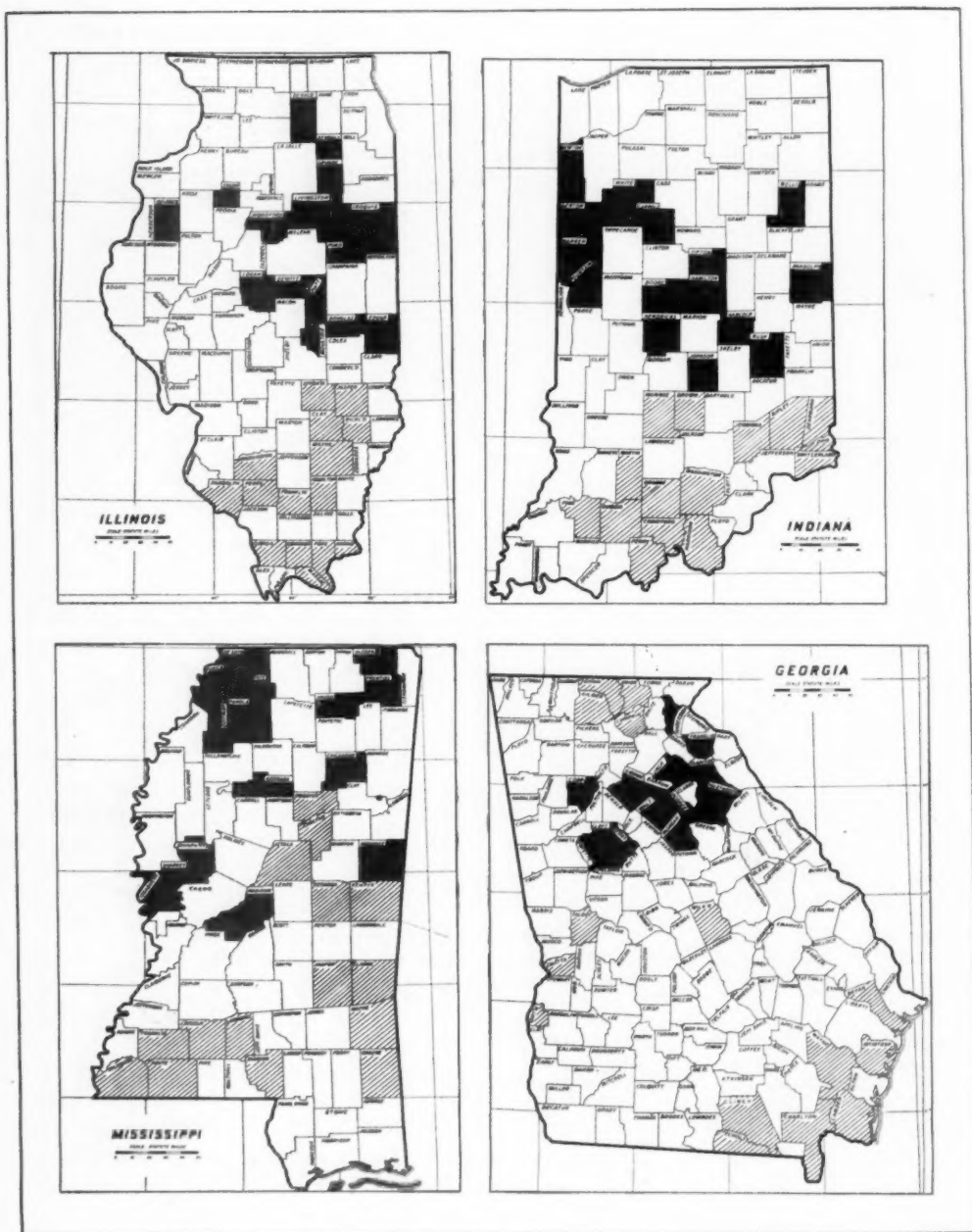


FIGURE 23—The fifteen good and fifteen poor counties in Illinois, Indiana, Mississippi and Georgia. Counties where the value of farm land is highest per acre shown in black; counties where the value is lowest are cross-hatched. Counties containing towns with population in excess of 10,000 not used in this study.



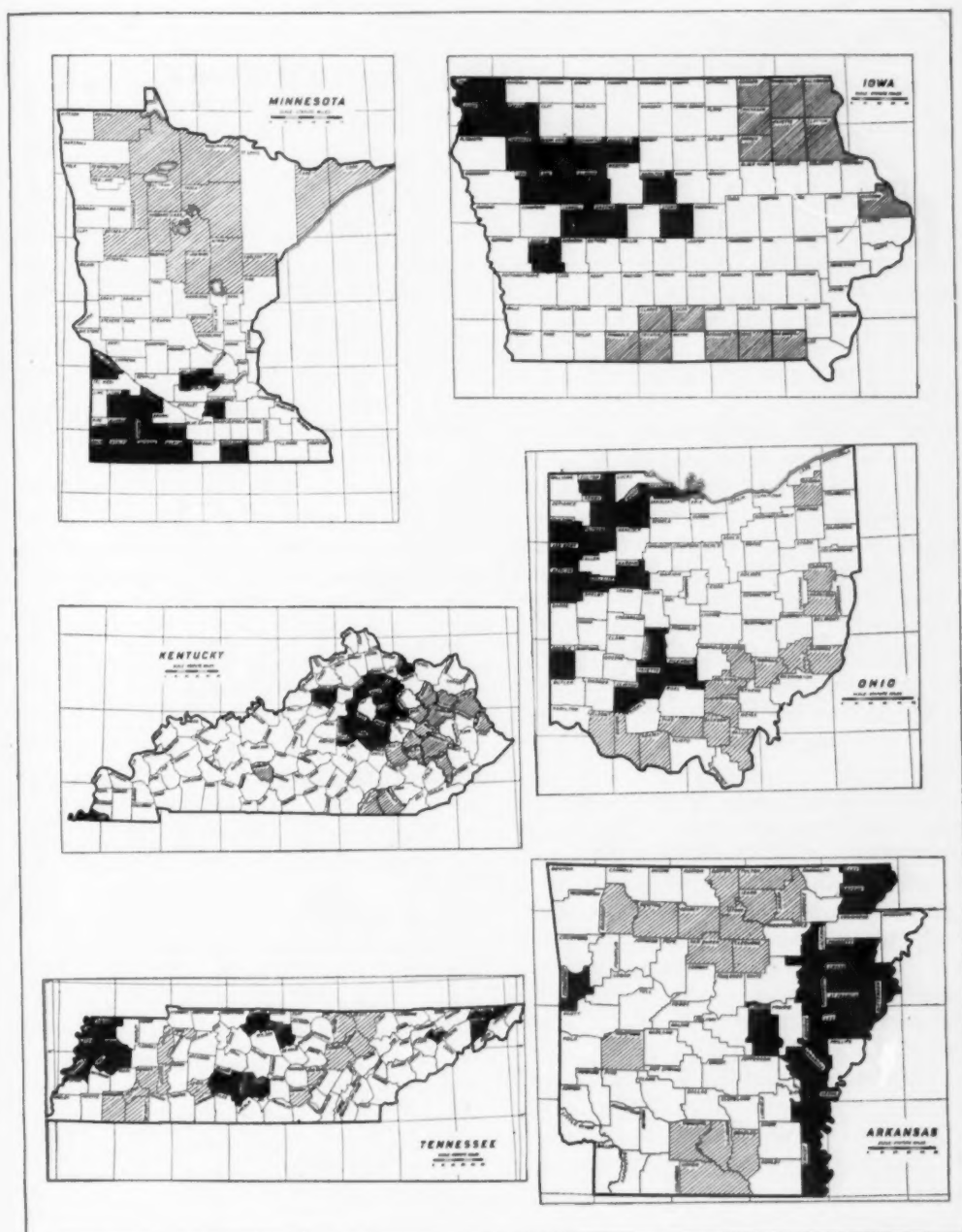


FIGURE 24—The fifteen good and fifteen poor counties in Minnesota, Iowa, Ohio, Kentucky, Tennessee and Arkansas. Counties where value of farm land is highest shown in black; counties where value of farm land is lowest are cross-hatched. No counties containing towns of population in excess of 10,000 used in this study.

## ARGENTINE TRADE DEVELOPMENTS

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THE trade developments of Argentina during the last fifty years have attracted the attention of the commercial world, and have raised Argentina from secondary position among the republics of South America to undisputed first rank, far ahead of all former rivals. The developments also have placed her among the first ten commercial nations of the world and have focused the attention of the harassed and food-hungry people of the nations of Europe upon her possibilities as a refuge and a home. Since the gates of the United States have been practically closed to immigration, Argentina's vast temperate areas and rich resources have attracted thousands of sturdy ambitious immigrants from the crowded districts of the homeland to seek relief and opportunity on her fertile plains.

Argentina supplies bread and meat in every increasing amounts to the hungry millions toiling in the densely populated centers of industry, and ships increasing quantities of raw industrial materials to the factories of northwestern Europe and east central North America. She furnishes 72 per cent of the world's exports of flaxseed, 66 per cent of the corn, 20 per cent of the wheat and wheat flour, 30 per cent of the hides and skins, 26 per cent of the total meat and meat products, 54 per cent of the beef and its products, and 17 per cent of the wool. This conspicuous part in the world exports makes Argentina a powerful factor in the trade in these commodities, affecting all countries which produce them for export and reaping the harvest of higher prices during seasons of shortage in other regions.

### THE GROWTH OF ARGENTINE COMMERCE

During the last fifty years the value of Argentina's trade has increased eighteen

fold, from 100 million dollars in 1875 to 1,820 million in 1925 (Fig. 1).<sup>1</sup> While various years registered marked fluctuations the growth of trade has been especially favorable. Also during most of this period the exports have exceeded the imports. From the standpoint of trends this period falls naturally into three parts: 1875-97, 1898-1913, and 1914-25.

The first part comprises a slow but steady growth of the exports and a rather marked increase of the imports up to 1890, followed by a decline which ended in 1897 at the level of that of twenty-two years before. During this period Argentina was predominantly a pastoral country; enormous estates, *estancias*, reckoned in tens of square miles, included most of the more fertile lands of the country, and the picturesque *gaucho*

<sup>1</sup>The statistics for this article have been compiled from:

1. Anuario del Comercio Exterior Republica Argentina, 1921, 1922, 1923, 1924, Direccion General de Estadistica de la Nacion, Buenos Aires.

2. El Comercio Exterior Argentino, en 1921 y 1922, Boletin No. 190; *Ibid.*, en 1922 y 1923, Boletin No. 191; *Ibid.*, en 1923 y 1924 y Estadisticas Economicas Retrospectivas, Boletin No. 193; *Ibid.*, en Los Primeros Semestres de 1924 y 1925, Boletin No. 194. Direccion General de Estadistica de la Nacion, Buenos Aires.

3. Analisis del Comercio Exterior Argentino en Los Anos 1910 a 1922, Direccion General de Estadistica de la Nacion, Buenos Aires, 1923.

4. Republica Argentina, Nociones Utiles, Tercera Edicion, Seccion Propaganda e informes, Ministerio de Agricultura, Republica Argentina, Buenos Aires, 1925.

5. The Yearbooks of the Department of Agriculture, Washington.

6. Publications of the Bureau of Foreign and Domestic Commerce, Washington.

7. The South American Yearbook, 1913, Louis Cassier Co., London.

8. Publications of the Pan American Union, Washington.

In addition to these sources, part of the material for the article was gathered from government officials, farmers, cattle men, and packers in different parts of Argentina during April and May, 1925.



FIGURE 1.—The exports and imports of Argentina increased eighteen fold from 1875 to 1925. This marked growth has lifted Argentina to the position of the leading commercial country of the Southern Hemisphere and to a place among the first ten commercial nations of the world. During the earlier half of the period the products of the animal industries dominated the exports while those of the farm led during the later. The exports based on the animal industries fluctuated less than those based primarily on farm products. The trade only a little more than doubled during the first half, but it increased almost 15 times during the second.

galloped freely over the plains, while the owner of the *estancia* reveled in the wealth that came to him from the profits of his grand scale cattle or sheep industry. No incentive impelled such owners to take up farming or to dispose of their land to farming colonists in a large way. Consequently the sheep and cattle industries held sway and furnished most of the exports of the country, about two-thirds until as late as 1894 (Fig. 2). As a result the fluctuations in trade from year to year were then less than afterward.

The only period that the imports of Argentina exceeded the exports occurred from 1882 to 1890, a fact of special significance in view of the developments taking place at that time. In the eighties the unprecedented construction of railroads to open up new territory and connect the interior with the river fronts and the seaboard, account in large measure for the heavy oversea purchases which increased greatly until just before the panic

of 1891. Yet this expansion and the influx each year of hundreds of thousands of immigrants (466,000 in three years 1887-89), who settled almost exclusively in the cereal belt, set the stage for the greater rôle farm operations were to play in the export trade of the republic during the closing years of the nineteenth century and the first quarter of the twentieth.

During the second period, 1897-1913, the exports and imports each increased from 100 million dollars to almost 500 million. In contrast to the earlier period, this one is characterized by a predominance of products of the farm over those of the *estancia* (the range). Pastoral Argentina kept the country behind Brazil and near Chile in commercial importance; a crop-raising Argentina has raised the republic to the position of leading commercial nation of the southern hemisphere. In 1903 the exports of the products of the farm almost equalled those of the animal industries (Fig. 3)

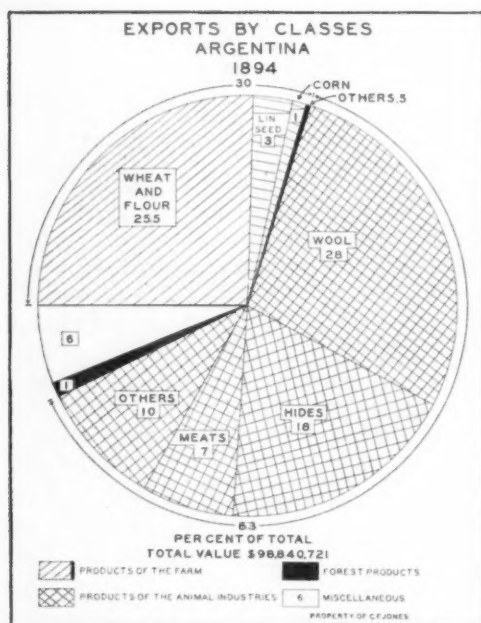


FIGURE 2.—For almost three centuries the products of the animal industries dominated the exports of Argentina, furnishing as much as 63 per cent of the total in 1894 and being represented then chiefly by wool and hides. Only one product of the farm—wheat and wheat flour—had assumed any importance in the trade, then accounting for one-fourth of the total.

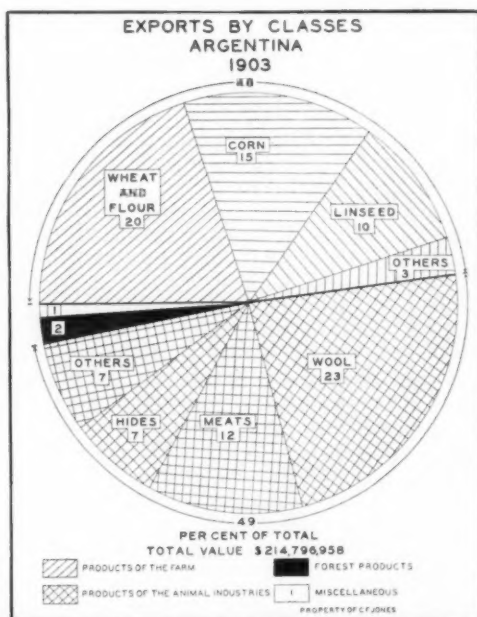


FIGURE 3.—The rivalry between crop and pastoral commodities in the trade of Argentina did not become acute until about 1900; up to that time the older staples held the lead. In 1904 the products of the farm passed the exports of those of the animal industries and since then the margin separating the value of the two classes has steadily widened.

while in 1912 the former made up 58 per cent of the total exports and the latter 39 per cent (Fig. 4). With a majority of the exports based on crops, the fluctuations of this period were much greater than those during the former. The extension of the railway mileage, the improvement of ports, the influx of large numbers of immigrants, and the increasing demand for foodstuffs in northwestern Europe opened the way for the marked development of Argentine trade which began about 1897 and continued to 1913.

While the trade during the preceding period increased five fold, it has just about doubled since 1913, yet the general trend of increase which began about 1900 has been maintained. Also it shows wider fluctuations in these years than ever before. The excessive amount of rain during the wheat and corn gathering seasons in 1913-14 reduced the export of corn and wheat to about one-half that of

the preceding year. The low corn yields of 1916 and 1917, the small wheat crop of 1917, the withdrawal of German and other shipping from South American services and the general disorganization of world commerce, accompanied by a ten fold increase in the freight rates from Argentina to Europe, held the exports of 1915 to 1917 at a level only a little above that of 1913 and reduced the imports materially.

The unprecedented demand for foodstuffs in northwestern Europe in 1917 to 1920, the war organization of world shipping, and the accompanying abundant harvests of corn, wheat and flaxseed in the Pampa doubled the trade of Argentina in three years; in 1920 the exports reached the billion dollar mark and the imports followed close behind with a total of 850 million. But such prosperity could not continue. In 1921 the trade decreased by one-fourth owing to



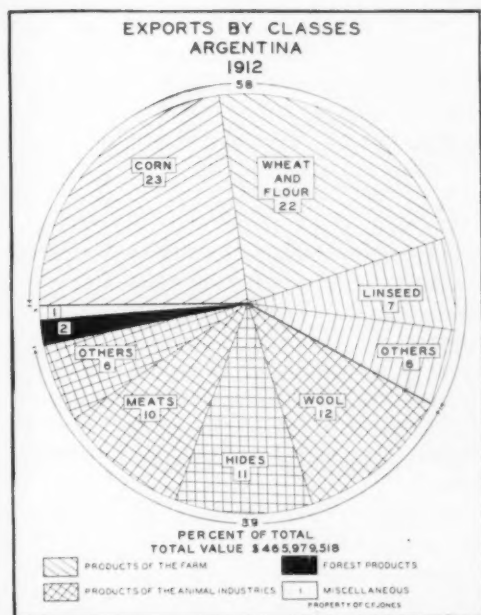


FIGURE 4.—In contrast to 1903, the products of the farm in 1912 made up 58 per cent of the total exports while those of the animal industries amounted to only 39 per cent. Wool, the leader in previous years, now held third place, being surpassed by wheat and wheat flour, and corn. As in previous years, the exports of commodities, other than agricultural, constituted less than three per cent of the trade.

the poor crops of wheat and corn in Argentina, the inevitable deflation in the over-expanded animal industries, and the financial crisis which followed the World War. However, the last three years, 1923-25, promise a favorable recovery from that brief period of sharp depression.

#### THE EXPORT TRADE

The commercial development of Argentina has indicated a remarkable expansion in pastoral and agricultural pursuits. The products of the range and the farm have always constituted a large part of the export trade; now they make up 96 per cent of the total exports (Fig. 5). This is inevitable in a new rich agricultural country, and in one lacking the essentials for large manufacturing industries. On the other hand the imports consist almost entirely of various manufactured wares and fuel.

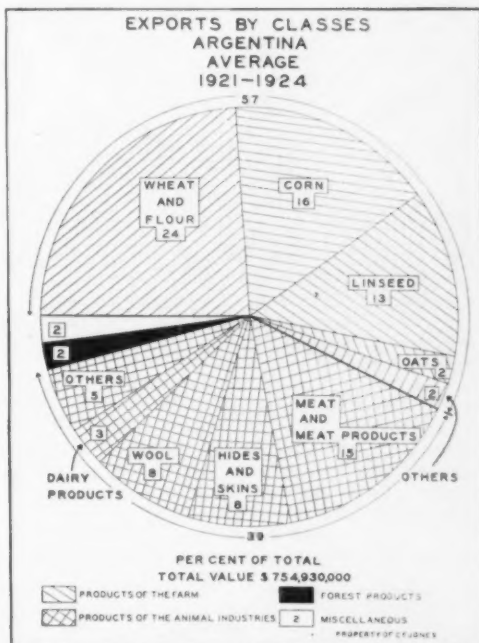


FIGURE 5.—While the exports increased from 465 million dollars from 1912 to 754 million in 1921-24 the relative importance of the products of the farm and the animal industries remained practically the same. Within the classes changes were registered. Wheat and flour, linseed, and meat and meat products increased, while wool, the chief product of the closing years of the nineteenth century, remained about the same in quantity, but had declined in per cent of total.

While the products of the farm and the range have dominated the exports they have not been equally important. Neither have the component parts of each division held the same position with reference to the total for the group nor the same position with reference to the total exports. For example, the chief products of the animal industries in 1894, hides and wool, which made up almost half of the exports of the country (46 per cent), constituted together in 1921-24 only 16 per cent of the total.

#### THE PRODUCTS OF THE ANIMAL INDUSTRIES

Animal products held first position in the export trade of Argentina for three centuries and they are still significant, for they make up 39 per cent of the total exports. For nearly three centuries after



FIGURE 6.—A rapidly disappearing figure from the plains of Argentina, the *Gaucha*, who sprang from the Spaniard and the Indian, a product of days when cattle, sheep and horses roamed over the billowy plains of the unfenced Pampa. He, a nomad, grew out of a natural evolution in adaptation to the environment of the Pampa separated from the ameliorating effects of intercourse and culture.

the founding of Buenos Aires Argentina had little chance to develop trade in crop products.

During Colonial times immense grants of grazing land were assigned to the favorites of the early Spanish conquerors so that within a century after their arrival almost all the country that lay within reach of the chief highways from Chile, Paraguay and Alto Peru had been claimed by their descendants. In early years there was little development of these estates except in the immediate vicinity of scattered towns. Indians still occupied much of the country, and herds of wild cattle and horses roamed over the unfenced grass-covered plain, and were hunted like any wild beasts, for their hides, skins, tallow and dried meat. This industry produced the *gaucho*, a picturesque figure whose dress adapted him to a life in the saddle (Fig. 6). Sheep introduced later and herded on the open plains added wool to the Pampa products which then made up nearly all the exports of the country.

World trade in agricultural products was comparatively small in those times, especially in the kinds of articles for which Argentina was best suited; the need of northwestern Europe for such crops as the Pampa could produce was

supplied from places nearer the region of consumption, while the need for pastoral products in northwestern Europe even then could not be supplied elsewhere more cheaply than in the rolling plains of pastoral Argentina.

#### WOOL

Throughout all this early period wool constituted one of the chief items of export and led all other commodities, amounting to 23 per cent of the total exports, as late as 1903 (Fig. 3). In 1912 it equalled only 12 per cent, having been surpassed by corn and wheat and in 1921-24 it formed only 8 per cent of the total.

During the early years the large areas of cheap temperate pasture lands and the relatively small population in Argentina, with the increasing demand for wool to supply the textile mills of northwestern Europe, gave optimum conditions for the development of an extensive sheep industry on a gigantic scale. Moreover, wool, being easily prepared and transported to market without appreciable deterioration, constituted a product suited to the means of transportation of the times.

The numbers of sheep in Argentina increased from ten million in 1864 to 66 million in 1888 and to 74 million in 1895. After the peak in the industry in the late nineties, the numbers of sheep decreased to 67 million in 1908, and to 36 million in 1922. Consequently the chief export commodity of former years—wool—decreased rapidly from 503 million pounds in 1901 to the low water mark of 195 million in 1920 (Fig. 7). While the quantity of wool exported has decreased the value of the shipments has increased considerably.

The decline of wool in the trade of Argentina has resulted chiefly from the decrease in the numbers of sheep in the expanding cereal belts of Argentina. For example, in the province of Buenos Aires alone there were in 1895 about 52 million sheep and in 1922 only 12,902,000. While considerable development of the

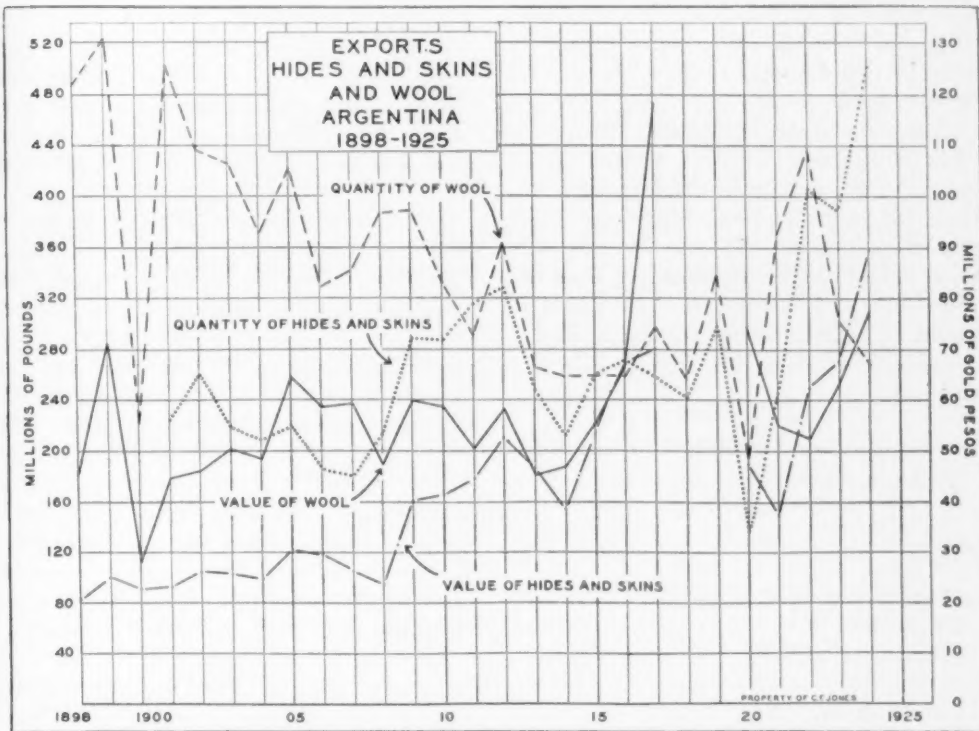


FIGURE 7.—The great decrease in the exports of wool from Argentina from 1899 to 1924 has been accompanied by a corresponding decrease in the number of sheep in the country, from 74 million in 1895 to 36 million in 1922. The level of hide exports has remained about the same for the last 25 years. Hides, once the main product of wild animals, are now for the most part a by-product of the meat industry.

industry has gone on in the south—Rio Negro, Chubut, Santa Cruz, and Tierra del Fuego—the increase has not been sufficient to balance the shrinkage in the Pampa, and sheep have thus lost in relative importance in spite of better markets and enhanced prices for their products. Far south in the bleak, wet, infertile frontier regions of Santa Cruz and Tierra del Fuego, where most of the land holdings are exploited for immediate profit without regard to conservation for the future, the persistence of the native pasture despite careless ranging and close cropping proves that this region is better suited to the industry than for agriculture. The ultimate and permanent concentration of sheep raising here rather than on the Pampa seems inevitable.

The exports of wool show a considerable increase in 1921 and 1922, being one

of four commodities which registered an advance in those years. However, the crisis in the sheep industry, the drop in the price of wool—1919-22, and the high price of lamb caused such indiscriminate slaughtering of sheep, especially lambs, as to materially reduce Argentine flocks and to decrease the exports of wool almost 170 million pounds or 30 per cent in two years. Also the prolonged droughts of the winter of 1924 caused an inferior clip, the fleece being foul with burrs and dirt.

These combined unfavorable conditions probably will enforce a relatively low level of exports for the next few years. In addition, in the cereal belts further displacement of the sheep industry most likely will result from expanding crop areas, since sheep do not fit as well as cattle or swine into a system of general farming, a system now being

developed in various parts of the Pampa (Fig. 8). On the other hand Patagonia may be relied upon to supply the world's woolen mills with a high grade fiber in considerable quantities (about 100 million pounds annually). This special grade wool is used chiefly in the United Kingdom for socks and stockings and high-grade underwear. It may be assumed with a fair degree of certainty that the remainder of Argentina can furnish about an equal amount for some time to come with improved methods of breeding and grazing.

#### HIDES AND SKINS

Hides and skins were associated export commodities of wool during the early commercial development of Argentina. Like wool, they were produced cheaply and could be handled fairly easily, and transported long distances without marked deterioration. In Colonial days domestic animals roaming over the Pampa were killed in large numbers and the skins removed, the carcasses being left for the dogs and buzzards or rendered into tallow, one of the export articles of those times. With the development of the manufacture of dried and salt beef (*tasajo*), hides became in

part a by-product. Later when the frozen and chilled meat industry was firmly established, hides and skins became more and more a by-product, except for the goat skins of arid Argentina and horse hides. Yet the exported quantities increased, except for a few years during the World War and the period of depression in 1920-21 (Fig. 7). This evolution in hide exports has yielded a better and a higher priced product.

Argentina, with 30 per cent of the world's exports of hides and skins and the large animal industries, certainly will continue to be a leading source of these items. However, the country, with expanding leather-working industries and with the production of large quantities of quebracho tannin extract, will consume more of her hides and skins; yet a considerable surplus will remain for export.

The change of the exports from the relatively imperishable raw industrial materials to foodstuffs resulted from a slow evolution through a long period of years. In 1878 extensive tracts of new lands were opened up. Politicians and military favorites acquired large grants of these lands. Thousands of immigrants poured into the country each



FIGURE 8.—Wool, the leading sheep product of Argentina, will come more and more from the semi-arid sections and the far south as sheep are being replaced by dairy cows, swine and cereals in the Pampa. The numbers of sheep in the Province of Buenos Aires decreased from 52 million in 1895 to 12.9 million in 1922.



year; they settled primarily in the cereal belts. Railway lines from river and ocean ports began to pierce the domain of the wealthy *estancieros*. The rapidly increasing population offered a labor supply beyond the absorptive power of the pastoral activities, while improved transportation made it possible for people to enter other occupations. Farming was stimulated also by changes exterior to Argentina which gave expanding markets for the cereal crops of middle latitudes.

The development of manufacturing industries of Europe forced the people to depend more extensively upon foreign foodstuffs, while the introduction of refrigeration made it possible for Argentina to realize on one of her greatest assets—the pastures of the Pampa. In 1877 the steamship *Le Frigorifique*, equipped with refrigerating facilities according to the Tellier system, began the transportation of frozen meat from Argentina to Europe, and in 1883 the frozen meat industry was definitely established in Argentina by the construction of the “Campana” plant, soon followed by other plants. All these developments paved the way for a trade advance which has placed Argentina in the front rank of countries exporting beef and beef products.

#### MEAT AND MEAT PRODUCTS

The introduction of refrigeration revolutionized the whole future of the animal industries in Argentina. It made possible the transportation of frozen and chilled meat across the tropics to European markets. Sheep carcasses heretofore largely rendered into tallow now entered the market as the chief meat export of Argentina and cattle, previously shipped alive or in the form of *tasajo*, or left on the plains for buzzards and dogs after the hides were removed, now were slaughtered in plants and the meat sold at advancing prices in more exacting foreign markets.

##### *Frozen Mutton*

Frozen mutton, owing to the large numbers of sheep; the comparative ease

of handling them in the early slaughtering plants, and the changes in the animal industries of the Pampa, made up a large part of the early trade of meats, amounting to almost 60,000 metric tons in 1898. It increased rapidly until 1902, maintaining first place up to that year and reaching a level which it held for ten years, a period marked by large decrease in the numbers of sheep in Argentina, especially in the Pampa; the numbers in the province of Buenos Aires alone decreased from 52 million in 1895 to 18 million in 1914.

For the decade following 1912 the exports averaged 52,000 metric tons, only two-thirds the amount shipped during the previous ten years. Factors accounting for this low level were (1) the indiscriminate slaughtering of animals in the preceding period, (2) the rise in the price of wool, (3) the natural decrease in the over stocked ranges in the more arid parts of the country, and (4) the attention of the meat packing companies directed to the exportation of other kinds of meat during the War (Fig. 9).

The last few years have registered a large increase in the exports of frozen mutton. The high price of lamb has resulted in wholesale killings, relatively low price of wool, and development of slaughtering plants in Punta Arenas. The high level of 91,300 metric tons reached in 1925 probably cannot be maintained. Wool has become the chief sheep product in Argentina and with a shortage of wool and an increasing price, killings of sheep will decrease. With a larger development of mixed farming in the Pampa, sheep will play a smaller rôle than heretofore for they do not fit into such a system as well as swine and cattle. The large expanse of semi-arid grazing lands of the country favor the wool type of sheep rather than the mutton type. Yet Argentina may continue to export in the neighborhood of 70,000 to 80,000 metric tons of mutton for some time to come. Of course, fluctuations will occur with a change in either the price of wool or that of mutton.

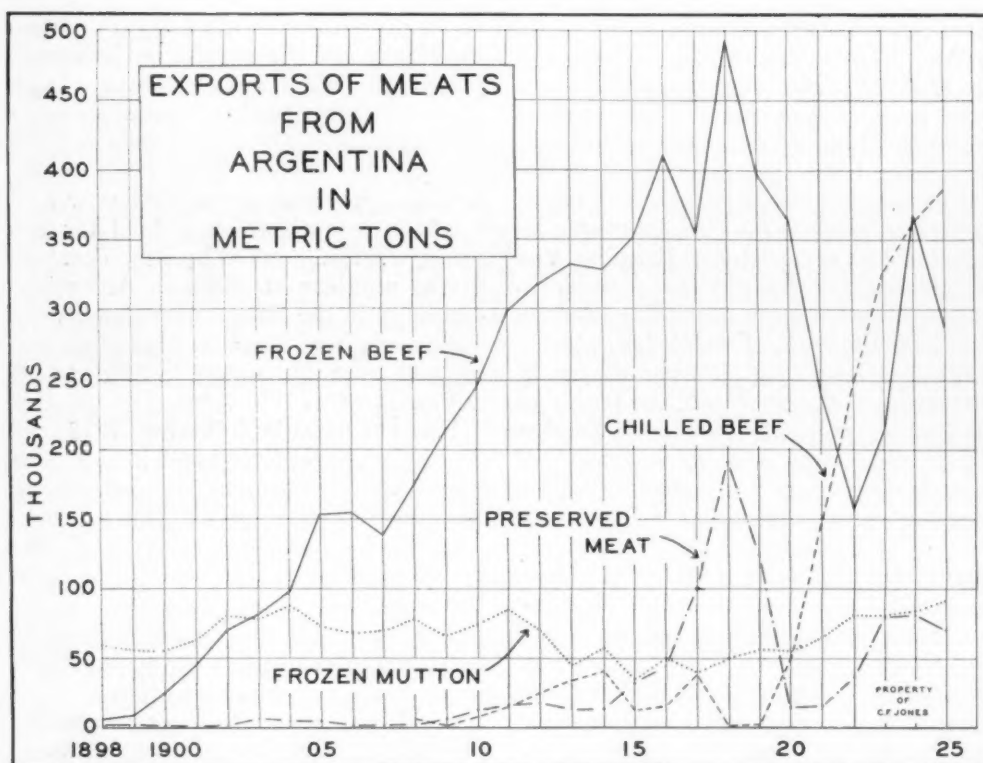


FIGURE 9.—Trends in the meat trade of Argentina. The marked increase in the exports of meats of the better grades has been one of the striking developments in Argentine commerce.

### Beef

In contrast to mutton the exports of beef, other than salted and jerked beef, became significant only after 1900, amounting to 25,000 metric tons or about one half those of mutton in that year. However, after the packing plants were firmly established the exports of beef increased at an amazing rate, from 55 million pounds to 1,490 million in twenty-five years, a twenty-seven fold increase. Beef—frozen, chilled, and preserved—forms 90 per cent of the shipments of meats from Argentina, while that country furnishes more than 50 per cent of the world's exports.

The salient trends in beef exports of Argentina and the leading position of that country in world's shipments of beef have grown out of unusually favorable conditions for the cattle industry in Argentina and significant changes in the

consumption and exports of beef in other parts of the world.

Large *estancias*, reckoned in tens of square miles and common to most parts of Argentina, favored the extensive development of the cattle industries; they afforded the necessary pasturage for thousands of cattle under one management. They gave, through the enormous profits from cattle or sheep raising on a gigantic scale, typical of the *estancias*, the funds sufficient to provide a comfortable *quinta* and living for the *estanciero* and all the members of his family, to educate the children in France or England, to furnish a wealthy villa in Buenos Aires, and to introduce imported purebred stock which has been a prime factor in the evolution of the animal industries in Argentina.

Up to the time of the introduction of refrigeration and the shipment of frozen beef and mutton comparatively little



FIGURE 10.—Rough cattle, which came from northern Argentina, grazing on native grasses on a large island in the Parana River near Parana. Before being sent to the packing plant they will be finished off on alfalfa pastures; even then they will make at best only a medium grade of frozen beef for continental Europe because they are large, rough and bony and consequently will not dress well.

was done to improve the herds and flocks of Argentina. As late as 1895 more than 75 per cent of the cattle were "scrubs". Today less than 20 per cent are classed in that category. Now some of the finest and most valuable (if not the finest and most valuable) Shorthorn cattle in the world are to be seen at the Argentine Rural Society's Show at the Palermo grounds in Buenos Aires. Although the Shorthorn is the favorite in Argentina, excellent herds of purebred Herefords, Aberdeen Angus and others graze on the native or alfalfa pastures of the large *estancias*.

The excellent native grasses of the Pampa favored the rapid development of the cattle industry and as long as the export products were hides, skins, *tasajo* and tallow they adequately met all requirements. However, soon after the exportation of frozen beef began it was demonstrated that, if Argentine beef was to enter European markets in competition with that from the United States and other beef-producing countries, it would be necessary to provide feed for finishing the animals, or for tiding them over a period of drought or winter inadequacy of native grasses.

Without alfalfa Argentina would occupy a far less important position as a beef producer in the markets of the world.

Alfalfa has made profitable the use of millions of acres of land that would otherwise be relatively unproductive. It sends the Argentine steer to market a year younger than the native *camps*. It produces a beef which sells in the English markets along with corn-fed beef from the United States. Without it thousands of animals would suffer during dry cold winters, or arrive in the markets in poor flesh. A large business has developed in raising feeders on poorer lands to the southwest and the Chaco to the north and shipping them to the alfalfa fields near a slaughtering plant to be fattened (Fig. 10). Alfalfa has increased considerably the carrying capacity of the range. Native grasses in the province of Buenos Aires will support one steer for every four acres on the average, while alfalfa range in the same area supports one animal per acre. However, during the fattening period this must be reduced somewhat.

Alfalfa pasture is worth about four times as much as the best combination of native summer and winter grasses. While alfalfa dies down in cool winters, with the return of spring it recovers much more rapidly than native grasses. Moreover, it furnishes from one planting excellent forage for five to eight years and in some sections as long as eleven.



FIGURE 11.—Alfalfa cut in the northern part of the Pampa and shipped in large quantities to the chief cattle sections carries thousands of animals over a dry cold winter in good condition when the native *camp*, the alfalfa pastures, and the oats ranges fail to supply ample forage for the cattle. Las Palmeras, Province of Santa Fe.

In late summer and autumn when the native *camp* dries up, the alfalfa fields stay green and furnish food for the animals. In winter oats replace alfalfa and native grasses as a forage in the northern part of the Pampa (Fig. 11). Of the total acreage of oats sown in Argentina in 1923-25 about 30 per cent were used as winter grazing. So valuable is alfalfa to the cattle industry of Argentina that on *estancias* of 25,000 acres in Santa Fe and Cordoba it occupies from 40 to 60 per cent of the land. It leads all Argentine crops in acreage, amounting in 1924 to 37 per cent of the total area devoted to crops. Its deep roots enable it to withstand fluctuations of climate better than native pastures.

While climate may have deterrent effects upon animal industries through a dry or a cold season, it in general favors the cattle industry. The short mild winters allow open grazing of the animals throughout that season, making the building of shelters and stall feeding for weeks unnecessary. This is a prime factor in the production of cheap, but excellent beef, as the steers put on weight throughout the winter season. While the summers are hot, intermittent refreshing gentle breezes alleviate the heat

and furnish power for pumping most of the water for the cattle (Fig. 12).

In addition to all these advantages the



FIGURE 12.—Throughout the cattle country of Argentina tall ghost-like windmills pump the water into enormous earthen tanks which serve the cattle of three or four fenced ranges. Coqueta Estancia, Entre Rios.



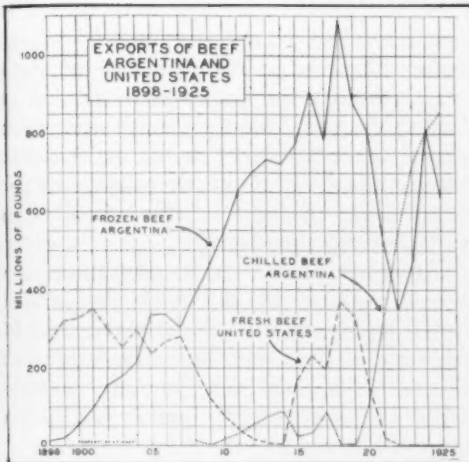


FIGURE 13.—The rapid growth of the beef industry of Argentina during the last twenty-five years has been coincident with the great development of alfalfa for grazing purposes, the marked decrease in the exports of fresh beef from the United States, and the improvement of the herds of the country. Not even the United States can surpass Argentina in excellent breeding methods.

best cattle country lies within two hundred and fifty miles of the great slaughtering plants and ocean transportation, giving, for the production of cheap but excellent beef, a combination of notable advantages found nowhere else in the world.

Aside from these special inducements the Argentine cattlemen and foreign

packers have been able to take advantage of the expanding markets in northwestern Europe for different grades of beef, and of the striking decline in the shipments of fresh beef from the United States. After the introduction of refrigeration the exports of frozen beef grew slowly until 1899 when a marked upward trend began which carried the total to 1,088 million pounds in 1918. The years which witnessed the birth of this growth saw the beginning of the decline in the shipments of fresh beef from the United States, a drop from 351 million pounds in 1901, the year the exports of chilled beef from Argentina commenced, to six million in 1914 (Fig. 13). Thus between 1901 and 1914 Argentina replaced the United States as the source of Europe's beef supply, not because she could undersell United States beef on the English market for she has always been able to do that, but because she could produce the larger surplus. The increased consumption and the decreased per capita production in the United States exhausted the surplus and paved the way for a remarkable advance in the Argentine meat trade.

Under war conditions our shipments rose again to 370 million pounds in 1917 but dropped in four years to less than 4



FIGURE 14.—A mixed herd of cattle being fattened on alfalfa. These cattle bred in a tick-free zone in contrast to those shown in Figure 10 are young, better boned and consequently will dress into better grades of continental frozen beef or if extra fat when they go onto the market they may make chilled beef. Province, Entre Rios.

million. This temporary rise and the increased exports of preserved meat (Fig. 9) and frozen beef to meet war needs reduced the shipments of first class chilled beef to almost nothing in 1918. However, with the removal of this pressure the movement of preserved and frozen meat from Argentina and fresh beef from the United States declined while the exports of chilled beef rose in proportion and during 1922, for the first time in the history of the meat trade, chilled beef took first place.

The whole cattle industry of Argentina has just passed through a crisis. The burden of the 1921 world depression fell heavily upon the livestock industry. After the few years during which cattle prices were exceptionally high and large profits were made, the inevitable reaction set in; the British market, the chief outlet for Argentine high grade meats, registered a sharp decline, prices falling to pre-war levels of 1909 and 1910, and completely paralyzing certain branches of the industry. The end of the war closed the foreign market for preserved meat, which had provided an outlet for the greatly increased supply of inferior native stock. Since that time only chilled beef for English consumption and superior frozen beef for continental markets have enjoyed any considerable demand (Fig. 14).

Under these conditions the future of the Argentine meat trade is somewhat problematical. Except for the Chaco, a tick infested region, Argentina is well stocked; only small areas of virgin pastures await occupation. They lie in the less desirable parts of the country. The numbers of cattle may be increased by a more intensive production of animal feed. However, against the prospects of augmented output of high grade beef for overseas markets through this means must be placed the increase in domestic consumption, and the diversion of part of the national breeding herd from beef production to the dairy industry. Larger immigration and closer settlement do not connote necessarily a larger output of

beef for export. A better quality of meat is more likely than an increased volume by the improvement of the animals through the diffusion of breeds of higher grades. Also the high prices for cereals recently have made agriculture more lucrative than cattle raising, as the subdivision of land in the cereal belts constantly proceeds.

American firms now dominate the meat packing industry of Argentina, handling 66 per cent of the cattle and 60 per cent of the sheep killed in Argentina during 1925. British packers slaughtered 19 per cent of the cattle and 19 per cent of the sheep.

It seems, therefore, that *no material increase* over the level of 1924 in the shipments of beef from Argentina would occur. On the other hand, the present volume may be maintained for some time to come. The indiscriminate slaughtering of cows and calves during the peak years has ceased. While the British market for high grade frozen and chilled beef has been slow, Germany, Holland, and France began to import some chilled beef and the demand for frozen beef on the continent has been active.

#### BUTTER AND CHEESE

With the evolution in the meat industry of the Republic has come the devel-

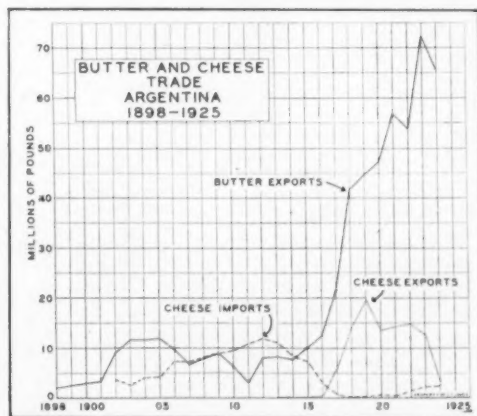


FIGURE 15.—The rise in the exports of dairy products indicates the agricultural trends in Argentina. The dairy industry has been developed especially in the central part of the Province of Buenos Aires and in Santa Fe near the city of that name.

opment of dairying. The exports of butter between 1898 and 1916 fluctuated between 2 million and 12 million pounds. During the latter year an increase began which carried the total to 72 million pounds, a six fold growth in seven years (Fig. 15). Before the War Argentina imported considerable quantities of cheese. By 1916 her production was almost sufficient to supply domestic demands; in that year an increase in exports similar to that of butter began. But this extraordinary trade development was nipped in the bud just short of 20 million pounds three years later. Since then cheese shipments registered a decline, amounting to only 3½ million in 1924. On the other hand, the exports of casein have grown materially.

This whole situation has resulted primarily from the abnormal conditions created by the war. Europe, unable to supply foreign markets with dairy prod-

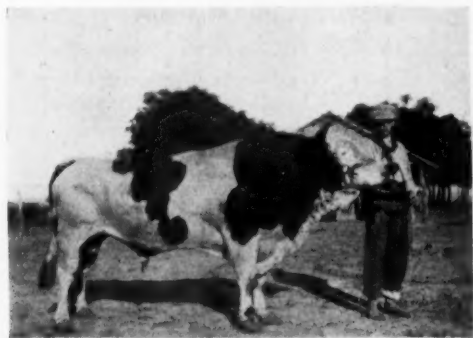


FIGURE 16.—With the marked improvement in the dairy herds now taking place and with the introduction of better methods of production, manufacture and shipment of dairy products Argentina will be able to play a more important part in the world's butter and cheese trade. A prize bull bred in the province of Buenos Aires and purchased by the owner of Coqueta Estancia, Entre Rios. In no other country are such uniformly high prices paid for animals of this type.

ucts, was replaced in some regions by Argentina. With the cessation of hostilities in Europe and the trend toward normal conditions Argentina has lost in her cheese shipments, and her imports are on the increase. On the other hand, the butter trade is more favorable. The high level of 1923 probably can not be

maintained in the face of severe competition in foreign markets, but the Republic will continue to produce a considerable surplus. Neither her cheese nor butter realize the high price paid for the fine quality products of other countries. While the dairy business is handicapped by periods of severe droughts, sudden fluctuations in temperature, and native hard and coarse grasses, it has shown a remarkable development and has large possibilities within the country with a greater use of alfalfa and the improvement of the herds (Fig. 16).

#### PRODUCTS OF THE FARM

In spite of the excellent advantages for the cultivation of a variety of crops in the Pampa, Argentina for a long time imported foodstuffs. As late as 1870 wheat and wheat flour were sent regularly from southern Brazil to Buenos Aires. At that time only one million acres were under cultivation in Argentina; within 25 years the cultivated land increased to 12 million acres. The competition between crops and pastoral products for first place in the trade of Argentina did not become keen until about 1900; up to that time, wool, hides, tallow and meats, the older staples, led with a wide margin. The only farm product of importance in the export trade in those years was wheat, which amounted to one-fourth the total exports in 1894. The ultimate supremacy of crop agriculture was, however, inevitable. In 1904 the exports of the products of the farm surpassed those of the range and ever since the difference separating the two has grown (Figs. 2-5). Though most of the land is still devoted to animals, Argentina commercially has become dominantly an agricultural country. Today the products of the farm constitute in value 57 per cent of the total exports, while the animal industries provide only 39 per cent.

During the last twenty-five years the country has developed from secondary rank in the exports of grain and flaxseed to leadership among the surplus pro-

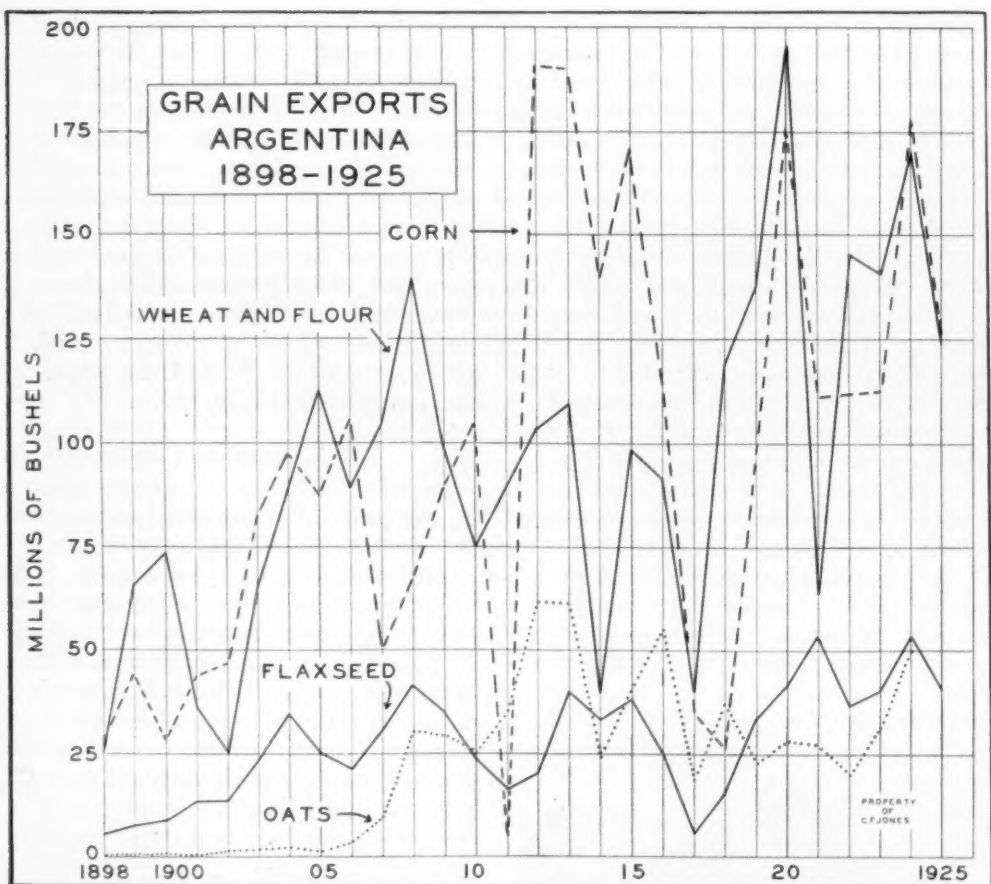


FIGURE 17.—The grain exports of Argentina from the standpoint of quantity fall into a major and a minor group. In the former are wheat and corn, and in the latter flaxseed and oats. Wheat, for many years the chief farm product exported, still maintains a leading position. Corn registers wider fluctuations than any other export commodity of the republic.

ducing countries. She now leads all countries in the shipments of corn, oats, and flaxseed, and ranks second or third in wheat and flour; she supplies 66 per cent of the world's export corn, 32 per cent of the oats, 72 per cent of the linseed, and 20 per cent of the wheat and wheat flour. With not more than one-third of the available area of crop land under cultivation, she has only begun to realize upon her wonderful agricultural resources. As in the past, the development of farming faces some serious problems. Transportation, permanent labor, methods of production and handling of crops, insect pests and diseases, the persistence of the grazing interests on

enormous land holdings, all present conditions which retard the early realization of the full possibilities of the crop lands.

In contrast to the products of the animal industries, those of the farm show more frequent and more striking fluctuations (Fig. 17). They are intimately related to the irregularity of good and bad seasons. Rainfall in the heart of the cereal belt, though amply sufficient on the average, varies widely from year to year with resulting losses from drought or excessive rainfall, a condition probably more pronounced in the grain regions of Argentina than in any other major cereal region of the world. A



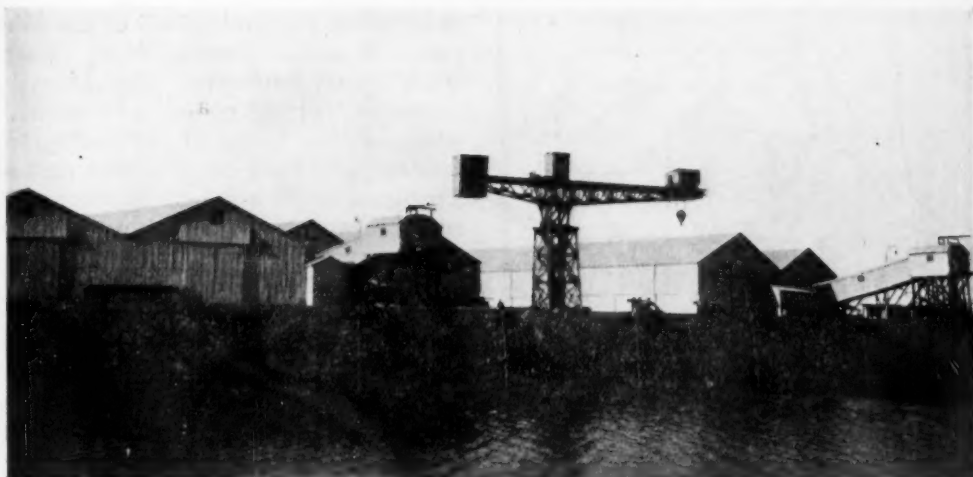


FIGURE 18.—Grain sheds and conveyors, Santa Fe, Argentina. The new and up-to-date grain handling equipment being installed at the leading ports, which lie within 250 miles of the cereal regions, aids materially in the movement of the increasing Argentine grain surplus.

fluctuation of 100 million bushels in the corn crop and one of 50 million in wheat is rather common, although in some years it is much greater. For example, after a crop of 175 million bushels of corn in 1910 the production for 1911 dropped to 27 million, owing to a bad season and the ravages of locusts. In the latter year the exports amounted to less than 5 million bushels. The following year the crop amounted to 295 million bushels, a fluctuation of 268 million bushels in one year. Also the wheat crop and consequently the export curve bear evidence of the unusual seasons. A week of rainy weather during the wheat harvest in Argentina boosts the world price of wheat; a series of bad years for corn, like 1915 to 1918, affect profoundly the corn trade of the world.

Many of the cereal farmers come from immigrant stock. They depend from year to year upon the sale of their harvests immediately after they are reaped. Holding over a season for a better price is almost impossible, because inadequate storage facilities force the farmer to convert his crop into cash, and an equalization of the movement from season to season is not possible. On the other hand, the large *estancias* engaged in cattle and sheep raising are owned by

men of ample means. With low prices the *estanciero* can store his wool and await the next season. The large packing concerns buy and kill with the changing market conditions, while the cereals must be harvested when ready and thus the exports register for each season the vagaries of the climate, the state of foreign demand, and the ravages of insect pests.

#### WHEAT AND FLOUR

Wheat, the first farm product that entered the export trade in an important way, still holds first place, making up 24 per cent of the total exports of Argentina in 1921-24. It was the first crop that encroached upon the grazing areas of the country. Adapted to pioneer conditions, and the immigrant farmer with small means, it also aided the cattle industry in an interesting way. The boom in the cattle business in the nineties caused many landowners to break up poor grassland in order to seed it to alfalfa; the easiest way to accomplish this was to rent land to *chacareros* who would grow two crops of wheat and then leave it sown with the prized alfalfa.

The exports of wheat and flour (mostly wheat) have increased from 25 million bushels in 1898 to an average

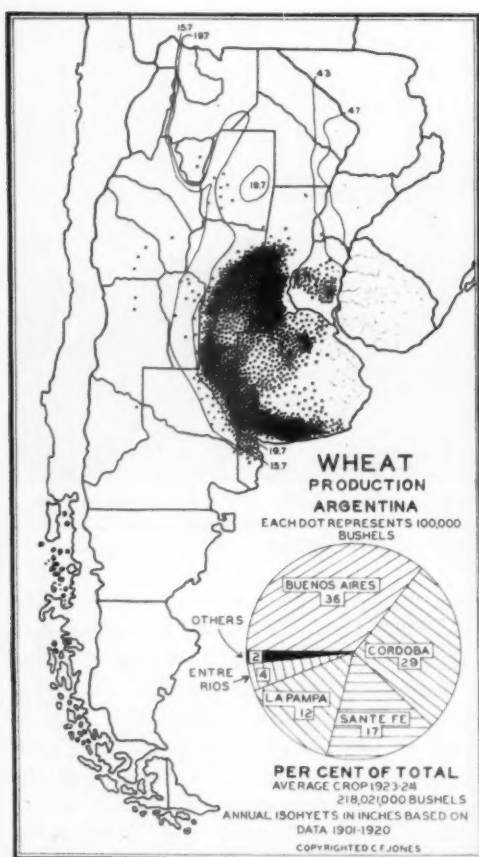


FIGURE 19.—The wheat region of Argentina is limited on the west by aridity and on the north-east by increasing humidity. Between these two zones apparently about 225,000,000 acres are physically adapted to wheat production. Within the area competition of other crops and the animal industries and large sections underlain by a heavy clay subsoil or by hardpan reduce the area available for wheat culture to possibly one-third of the preceding figure. Yet with only 30 per cent of this area yielding wheat at 13 bushels per acre Argentina could furnish for export three times the amount of wheat now shipped to foreign markets. (Statistics of wheat production from *Estadística Agro-Pecuaría*, May 1923, and June 1924. Ministerio de Agricultura de la Nación, Buenos Aires; Hoxmark, Guillermo, "Las Condiciones Climatológicas y el Rendimiento del Trigo," Cir. No. 501, 1925, De La Oficina Meteorológica del Ministerio de Agricultura de la Nación, Buenos Aires.)

during the last three years of almost 150 million, a six fold increase. This growth has resulted from an augmented demand for breadstuffs in the world marts, the development of railway transportation facilities in Argentina, the construction

of elevators and grain sheds at the chief ports—Rosario, Buenos Aires, Bahía Blanca, and Santa Fe (Fig. 18)—the enormous increase of the area sown to wheat at the hands of the immigrant farmers, who have come to this part of Argentina by the hundreds of thousands, and at the hands of the wealthy *estanciero* who converted a larger part of his holdings into alfalfa range.

Wheat in Argentina, in contrast to that in the United States, is primarily an export crop, two-thirds of the total production being shipped to foreign markets. The small population of the country and wheat farming on an extensive scale with labor saving machinery of all kinds enable the country to produce a large surplus, and the location of the wheat belts within 250 miles of one of the main ocean or river ports means low transportation costs in comparison to those in the United States and Canada where the export wheat grows in the interior more than a thousand miles from the sea.

With only about one-third of the available crop land of the country under cultivation, Argentina has considerable possibilities as a wheat producing and exporting country. Wheat now occupies only 29 per cent of the area under crops<sup>2</sup> and the yields of wheat are low compared with other countries of extensive cultivation. A growing European demand, immigration and closer settlement of the land, more intensive cultivation, and the development of new wheat lands will augment the crop and the exportable surplus of Argentina.

The country has about 225,000,000 acres physically adapted to wheat culture (Fig. 19). Only about 5 per cent of this area now grows wheat. With 30 per cent of this land yielding wheat at thirteen bushels per acre, Argentina could produce about 900 million bushels of wheat annually. While the country does have large potentialities, it will be some time before her crop mounts even

<sup>2</sup> This percentage has been based on the total area in crops, including alfalfa.

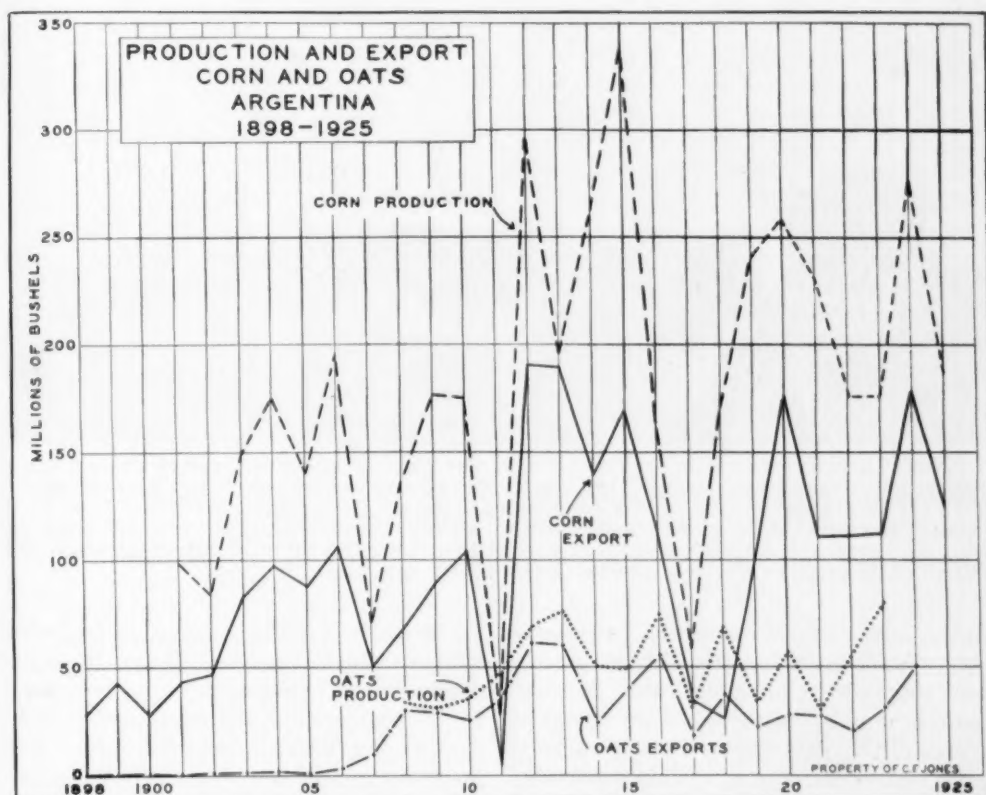


FIGURE 20.—Corn and oats in Argentina, in contrast to those in most other producing regions, are primarily export crops, as much as two-thirds of the yield being shipped to foreign markets. With the development of mixed farming in Argentina the per cent of the crop exported will decrease; increasing amounts of corn will be used to fatten beef and swine, while oats will be used more for horse-feed.

to two-thirds of this figure. Yet wheat certainly will play an important part in the export trade of the country for a long time; also it will become a larger factor in the world wheat market. For the next few years it may be assumed that Argentina will ship from 140 to 195 million bushels. Of course marked fluctuations are to be expected owing to unfavorable weather conditions, with their attendant ills, and to competition by other exporting regions.

#### CORN

Argentina, credited with 66 per cent of the world's exports of corn enjoys an enviable position in the trade of this commodity. She gained this rank almost entirely during the first quarter of the twentieth century, her exports in-

creasing from 28 million bushels in 1900 to 150 million for the last two years (Fig. 20). Like wheat, corn culture developed with the general evolution of agriculture in Argentina during the closing years of the nineteenth century and the opening years of the twentieth. Corn holds in value the second place in the exports of Argentina, being followed closely by meats and meat products.

While the fertile, friable soil free from stones and stumps, the low relief, the general climatic conditions, and the location of the corn belt near ocean transportation favor the extensive production of corn for export, the conditions are not ideal because the average annual precipitation is sufficient for a good crop only when properly distributed. In the central area the maximum rainfall comes



FIGURE 21.—Much corn in the (*troje*) crib built of wire, corn and cane stalks during wet seasons may spoil because of insufficient aeration. In a country with small timber resources it is difficult and expensive to procure lumber for cribs. After being shelled the sacked corn is piled in the open to await shipment, being exposed on many farms to the weather. However, better methods of storing and handling corn which are receiving considerable attention by the Government ought to improve considerably the quality of the exports. Province, Buenos Aires. (Courtesy of H. G. Olds.)

in the late rather than in the early summer. Variations from season to season are marked. Unusually wet harvest periods coupled with the high temperatures of this part of the country cause a great deal of the corn to spoil in the fields, in the *troje* (Fig. 21) or en route to northwestern Europe. During dry springs

the growth of corn is retarded and the locusts, which are ever present in some degree, then come by the millions and eat the young corn to the ground. Such handicaps explain in large part the wide fluctuations in the export movement.

A primary factor in the expansion of corn culture in Argentina has been the



FIGURE 22.—An immigrant adobe hut, without floor and covered with galvanized iron sheeting near Ceres, Province, Santa Fe. The agricultural immigrant rents a piece of land from a large land owner who gives him seed, implements, and animals for one-half the crop delivered as the owner may specify. All members of the family work hard during the busy seasons; they have no comforts, only bare necessities. They have been a leading factor in the evolution of agriculture in Argentina and are paving the way for a still greater advance.



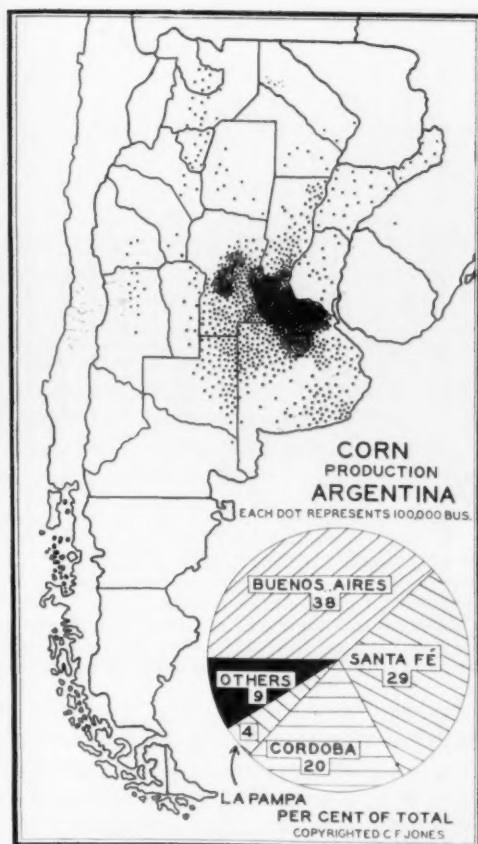


FIGURE 23.—The great "corn belt" of Argentina, the area which supplies 66 per cent of the export corn of the world, lies in the central part of the fertile Pampa. While corn may be grown in many parts of Argentina, its commercial production has been confined to districts within 200 miles of water transportation. To Rosario, Santa Fe, and Buenos Aires a network of railway lines bring the golden harvest of the Pampa. Corn is not grown in southern Entre Rios because of the swampy condition of the land, the lack of transportation facilities and the persistent cattle interests in the enormous estancias.

influx of thousands of European agriculturists who settled on the estates of the large land owners, rented a bit of land and cultivated it with a few horses, a plow, and a harrow loaned by the landlord, and paid as rent a share of the crop, usually one-half (Fig. 22). With small capital and little machinery the methods of cultivation were exceedingly poor, much of the corn being sown broadcast and allowed to do its best among the weeds. Of course the corn under these

conditions usually is of poor quality and more subject to climatic variations and the ravages of insect pests.

Yet with all these handicaps Argentine corn dominates world trade. It goes primarily to northwestern Europe and there competes with corn from the United States, Roumania and Hungary. Argentine corn is preferred and purchased in preference to corn from other countries. This preference in northwest Europe is attributed to the smaller kernels which make it better adapted to poultry feeding than American corn, its superior sweetness which makes it preferred as horse feed, and its low moisture

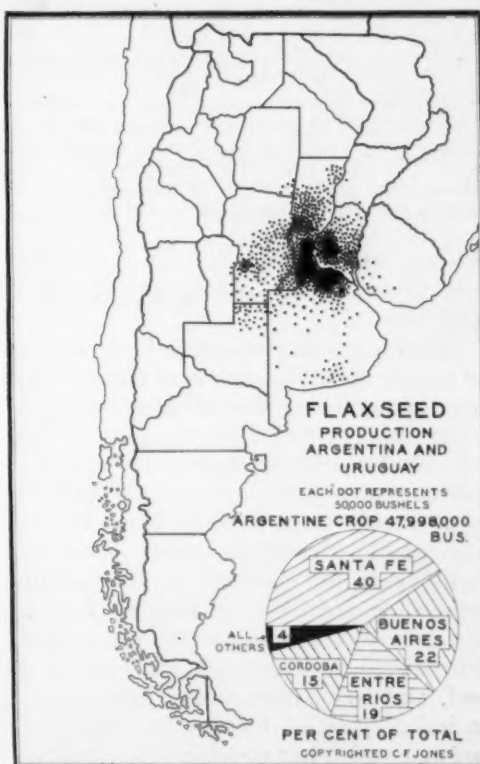


FIGURE 24.—The chief flax producing areas in Argentina lie in the provinces of Santa Fe, Buenos Aires, and Entre Rios near deep water transportation. On the outer margins of the cereal belts it grows on virgin soil which is being converted into crop land or high grade alfalfa range. Argentina leads all countries in the production and exportation of linseed, supplying 72 per cent of the world's exports. (Statistics of Linseed production from *Estadística Agro-Pecuara* May 1923 and June 1924. Ministerio de Agricultura de la Nacion, Buenos Aires.)

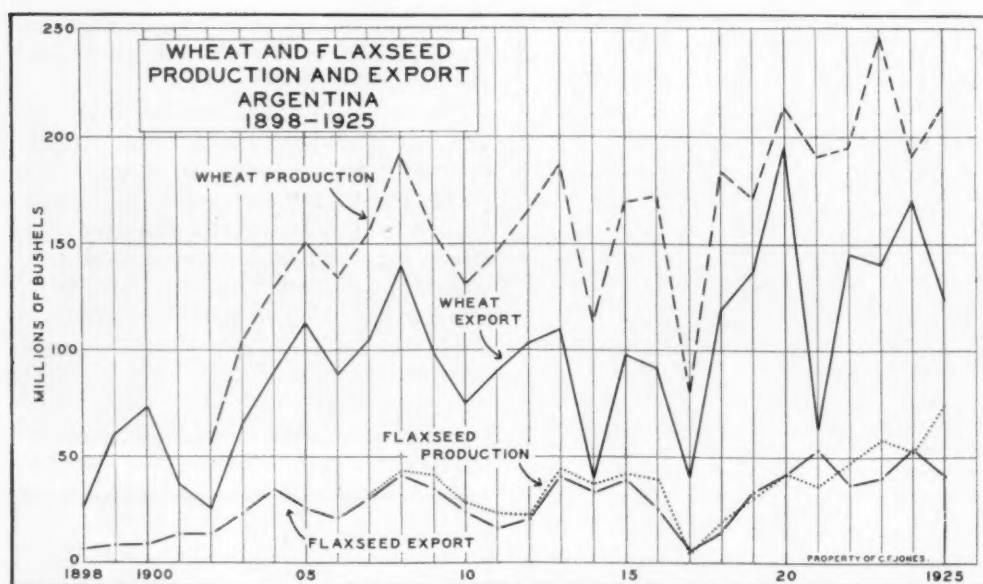


FIGURE 25.—Flaxseed, even to a greater extent than wheat, in Argentina is an export crop. Flax thrives exceptionally well under fluctuating conditions of heat and drought and is grown in the better parts of the Pampa. As a result the production and exports do not fluctuate as much as those of wheat which grows more on the margins of the cereal belt and consequently in unusually dry and wet seasons shows great variations in yields.

content which makes it ship better and keep in good condition longer than American corn.

While corn in Argentina is primarily an export crop, two-thirds of the crop on the average being thus disposed of, and while the country has capacious areas suitable for its cultivation, it certainly will not occupy as prominent a place in future trade as wheat (Fig. 23). Wheat will remain chiefly an export crop for many years, but corn will be diverted by degrees into other channels. Larger amounts of it will be used in the animal industry to produce high class corn-fed beef, and to increase swine production, an industry in its infancy in Argentina and one which has considerable possibilities. Yet Argentina will be the leading corn exporting country for some time, furnishing on the average about 150 million bushels for the export movement.

#### LINSEED

Linseed holds fourth place in value in the exports of Argentina with 13 per cent of the total (Fig. 5). Linseed from Ar-

gentina makes up 72 per cent of the world's exports in this commodity. In contrast to the leading three commodities, it goes into industrial uses instead of food products, being in this respect like wool and hides, the fifth and sixth items in the export trade.

Flax, grown almost entirely in the heart of the cereal belt of Argentina, finds there favorable conditions for an abundant harvest on an extensive scale (Fig. 24). It fits in well as the first crop on new lands being converted from rather inferior native pastures to excellent alfalfa range or to crop lands, and is used in rotation with wheat, corn, and oats in the regions of general farming. It is planted, harvested, and threshed by processes very similar to those of wheat and oats. On the fertile friable loam soils of the Pampa it thrives exceptionally well under varying conditions of heat and drought, and thus shows less marked fluctuation than corn, wheat or oats.

Linseed exports have increased from 8 million bushels in 1900 to an average of

48 million during the last two years, a six fold increase.

Flaxseed in Argentina is even more an export crop than wheat and corn; practically all the production goes to foreign markets (Fig. 25). As a result, in contrast to these food commodities, the exports in a given year frequently are greater than the production. With the development of mixed farming and crop rotation in the Pampa and the opening up of new lands flaxseed exports may increase considerably. Conditions affecting the export movement are the world demands, the increased use of substitute for linseed in the making of paints, and the production in other countries.

#### OATS

Oats, while making up less than two per cent of the total exports, have come to be a rather important crop in the Pampa during the last twenty years (Fig. 21). They form in Argentina to a greater extent than in any other country an export crop, more than three-fourths, except for the last three years, going to foreign markets. Argentina supplies about one-third of the world's exports. While they occupy a secondary place in the crops of Argentina, they fit well into the system of farming and cattle raising developed, being rotated with wheat, corn and flax. They are sown in the autumn and grazed by cattle during the winter months when the native pasture and the alfalfa range become short, and later harvested in the summer. Being used so largely as feed they do not seek the active demand in the foreign markets that wheat does. Oats will continue to be a minor export commodity in comparison with the major cereals. Yet the country may export considerably more than 50 million bushels in the next few years.

#### FOREST PRODUCTS

A striking fact in the export trade of Argentina, a country deficient in timber products, is that forest products count for 2 per cent of the exports (Fig. 5).



FIGURE 26.—A large consignment of quebracho logs piled on the docks at Santa Fe ready for shipment to northwestern Europe and the United States, where they are utilized for tannin extract. The rapid cutting of trees will soon exhaust the more important forests of Argentina, causing forest products to decline as an item in the export trade.

These consist entirely of quebracho extract and logs. The quebracho, native to the temperate deciduous forests of South America, is the most important source of tannin in the world. It has been the principal reserve for European demand, and in the United States it heads the list of tannin imports (Table 1). Sixty per cent of the extract and 62

TABLE 1

THE EXPORTS OF QUEBRACHO FROM ARGENTINA  
FOR THE YEARS 1913 TO 1924

(In metric tons)

	Quebracho Extract	Quebracho Logs
1913.....	79,684	383,964
1914.....	80,153	291,942
1915.....	100,213	209,679
1916.....	97,574	161,734
1917.....	90,777	133,170
1918.....	124,710	9,279 <sup>3</sup>
1919.....	139,700	54,600
1920.....	122,800	56,600
1921.....	94,300	40,000
1922.....	167,800	124,800
1923.....	204,000	123,800
1924.....	180,912	94,037

per cent of the logs go to Europe while 25 per cent of the former and only 18 per cent of the latter go to the United States (Fig. 26).

The quebracho tree possesses a far higher tannin content than most woods of the forests of the northern hemisphere

<sup>3</sup>For 1918 the figures are for the six months, Jan.—June.

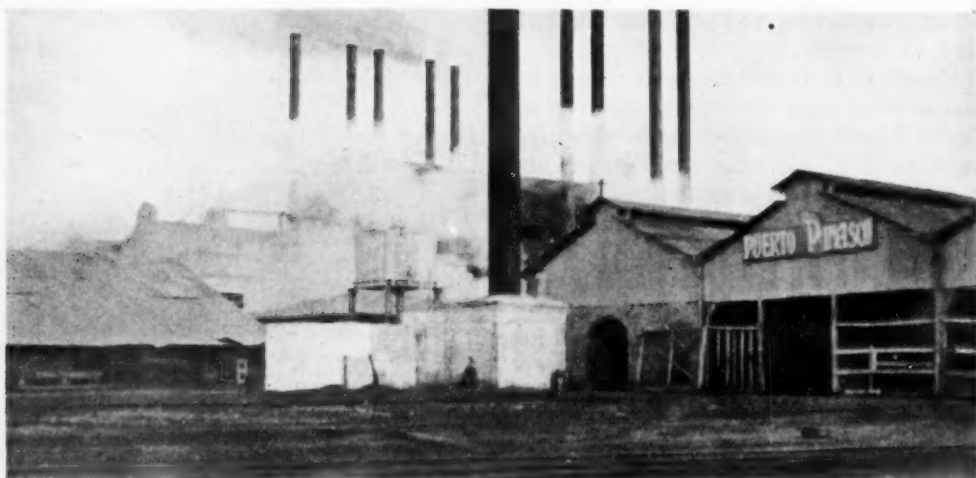


FIGURE 27.—An extract factory on the Paraguay River at Puerto Pinasco, where the quebracho logs go through the chippers and come out later as tannin. The location of the forests near the streams and the mills on the rivers affords cheap transportation for the extract or the logs to the ocean ports.

(twice as much as hemlock). It grows along the water courses of northern Argentina and Paraguay and therefore can be loaded on river and ocean boats from the door of the extract factories, a significant item in the exportation of a commodity in regions lacking rail transportation (Fig. 27).

The quebracho export trade began about 1880. Germany was the chief consumer, using tannin largely for the manufacture of sole leather. The trade grew slowly for years, but in 1916 the exports amounted to 22 million dollars; they averaged only 15 million from 1921 to 1924. The present rate of cutting the timber adjacent to the streams will exhaust the better grade forests within a comparatively few years. A marked increase in the exports is not to be expected owing to the mounting costs of procuring the more inaccessible trees and to the larger use of tannin from tropical seeds, barks and leaves.

#### THE IMPORT TRADE

While the exports of Argentina consist almost entirely of raw industrial materials and foodstuffs, more than 90 per cent of the imports are manufactured wares of a great variety. This is inevitable in a country so lavishly endowed

with agricultural resources and so miserably deficient in the basic elements for manufacturing establishments.

Argentina has no iron ore, no large forests, and only a sprinkling of other minerals located in the arid mountain sections of the country—all these and more are essential for a significant industrial development. In the mineral regions scarcity of water and fuel and inadequate transportation facilities have prevented mining—or even a careful survey of mineral resources. The Republic holds only small deposits of undeveloped high grade bituminous coal in the territory of Neuquén. Some coal has been mined and shipped, but the coal resources at the present time have little importance because they lie 500 miles from Bahia Blanca, the nearest city of any size, and 1,000 miles from Buenos Aires. Coal shipped from Neuquén to Buenos Aires by rail costs more in that city than British coal.

Though the country has considerable undeveloped or potential water power, the sites all lie in remote and sparsely populated regions—too far from the population centers to play any part in the development of manufacturing at the present time.

From the standpoint of fuel oil and



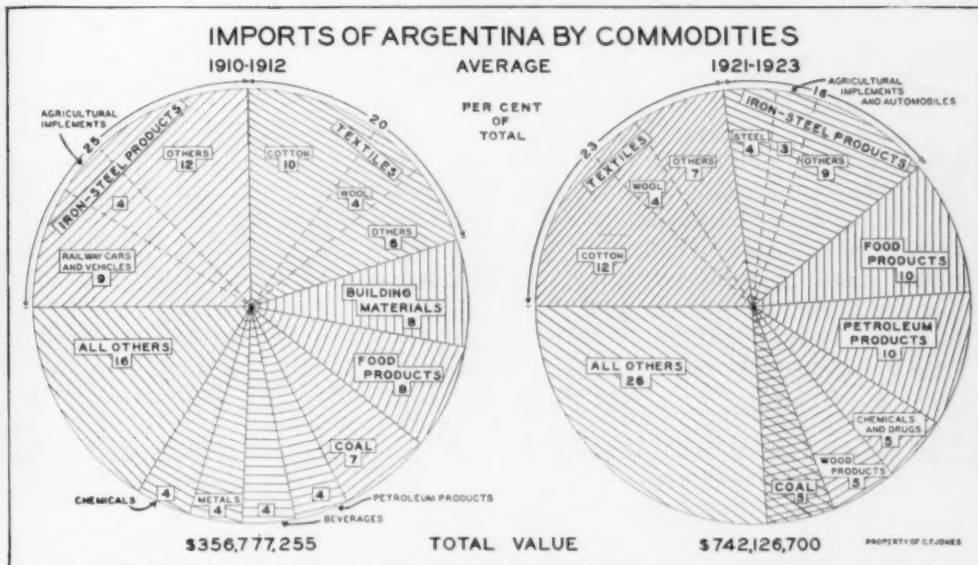


FIGURE 28.—While the import trade of Argentina has more than doubled in value since 1912, the leading articles imported then are the chief ones received now. In contrast to the exports of the country, the imports are made up almost entirely of manufactured wares. Since Argentina does not have adequate supplies of the fuel and minerals for manufacturing industries, she must continue to import large quantities of fabricated articles.

petroleum products the situation is more favorable. In the Comodoro Rivadavia and other fields Argentina possesses valuable oil deposits, which assume large importance because of the general lack of fuel throughout the country, but petroleum products at present constitute as much as 10 per cent of the total imports.

Most of the manufacturing industries

of the country have been developed under a high protective tariff because products made in the country on foreign fuel cannot compete with the cheaper, but better imported commodities. In fact, the Argentine protective tariff goes beyond anything ever dreamed of in the United States, by even the most partisan protectionist. It comes close to being



FIGURE 29.—In contrast to the cereal regions of North America, all grain in Argentina is handled in jute bags from the machine to the steamer. The lack of elevators and the inadequate sheds for storing the grain at railway stations in rainy seasons allow much grain to spoil or to arrive in the market in very poor condition. Storage sheds of galvanized sheet iron are being constructed at most of the railway stations, but as yet these can store only a small part of the crop. The cost of handling grain in bags is enormous because of the scarcity of labor. (Courtesy of H. G. Olds.)

the most unscientific tariff possible, and there seems to be no limit to the protective measures the government will adopt to foster infant industries. Behind this economic barrier considerable quantities of hosiery, nearly all of the shoes, and some woollen goods and cotton underwear are fabricated. However, textiles, automobiles, general iron and steel goods are not made in sufficient volume to make the business especially profitable. As a result the leading classes of imports consist of textiles and iron-steel products.

#### TEXTILES

While Argentina supplies 17 per cent of the world's exports of wool and grows annually  $10\frac{1}{2}$  million pounds of cotton, manufactured textiles, the leading class of goods imported, form twenty-three per cent of the total (Fig. 28).

Cotton goods, the leading item in the import trade with 12 per cent, make up more than half the textiles. They include the whole range of cottons from the heavier unbleached sheetings and gray drills to fancy voiles and cotton-silk fancies in brilliant colors. Cotton goods are suited to the climatic conditions in half the country and lie within the buying power of most of the people, while the better grades of woollen and silk goods are too expensive. Probably at the present time in no other line of goods exists such a strong competition. The United Kingdom, formerly controlling the trade, now meets competition from France, Belgium, Italy, the United States, Czechoslovakia, Spain and Japan.

Woollen goods are about one-third as important as those of cotton in the import trade. In contrast to cotton textiles, nearly all the woollens are of the high class or medium grade goods, as local competition in the cheaper fabrics is intense. In high class men's suitings England still holds the market, while France dominates it for ladies' woollen dress goods, fine fancy woollens and silk and wool mixed. Cotton and woollen fabrics enter Argentina over a high duty.

Other textile imports in the order of importance include jute bags, silk and linen. The last two are expensive and enter only the better restricted markets in the large cities; the first move into the country districts to receive the harvest of grain as it pours from the machine, or into the slaughtering plants to clothe the frozen and chilled meats for an ocean voyage to northwestern Europe.

Nearly all grain in Argentina moves in bags from the threshing machines to the hold of the exporting steamer; the annual bill of Argentina for grain bags amounts to about \$15,000,000 (Fig. 29). Rosario, only one of the four large grain ports, supports some thirty dealers in bags. Trade in jute goods remains preëminently British, Bengal continuing to be the world's sole source of supply.

While the textile trade of Argentina exhibits strong competition, that country today constitutes one of the great markets in the world. The trade is likely to increase considerably even in the face of an enhanced production of raw cotton in the Chaco; Argentina lacks the cheap power for a large local industry, and there must be a limit beyond which the mounting import duties cannot go. An increasing population and the settlement of the warmer part of the country will create a demand for more of the cheap and coarse cotton fabrics.

#### IRON AND STEEL PRODUCTS

All kinds of iron and steel products must enter Argentina to keep in motion the great flow of foodstuffs and raw industrial materials required for the mills and the hungry millions of the chief manufacturing regions of the world. This class includes everything from the frail wickwire goods to the huge locomotives, railway cars, and the massive combined harvester-threshers; it comprises 16 per cent of the total imports; in 1910-12 it led with 25 per cent. However, the value of the recent imports amounted to 25 million more than those of the preceding period. While nearly



FIGURE 30.—Representatives of the agricultural implement manufacturing concerns of the United States have studied the needs and wants of the Argentine farmer and have attempted to make machinery adapted to the conditions of farming in the Pampa, with the result that the United States now supplies 80 per cent of all the agricultural implements and parts imported by Argentina. United States firms so dominate this market that it will be difficult for anyone else to get a foothold in the trade. (Courtesy of International Harvester Company.)

all items show an increase, Argentina produces under the protection of a high tariff larger quantities of some goods, especially structural steel of all kinds, tanks, small machinery, bolts, rivets and some farm vehicles.

About 50 concerns in Argentina manufacture various implements classed as farm machinery and equipment. Most of the establishments, however, are mere shops specializing in one or two particular articles. There is only one large plow factory in the whole country, and only two or three others turn out a small number of special implements. In all cases the designs of the articles made locally resemble closely the popular types of American and European models. Although the Argentine laws require the country of origin to be stamped on all manufactured wares, whether of foreign or domestic make, the Argentine producer has a tendency to allow his wares to pass off as imported, when such inference can be made. This emphasizes in a striking way the preference of the buyer.

#### AGRICULTURAL MACHINERY

On the other hand, the salient machinery and supplies emanate from overseas in ever increasing amounts to sow, cultivate, harvest and transport the great crops of the Pampa (Fig. 30). The

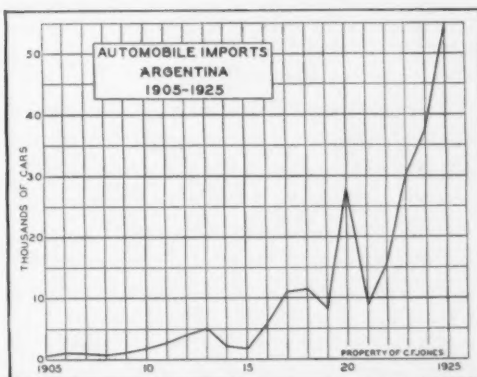


FIGURE 31.—The imports of automobiles by Argentina. The striking drop in receipts in 1921 resulted from the period of world depression and the crisis in the cattle industry. The marked growth of the trade in recent years corresponds to a return to almost normal conditions and to a series of good years in the output of Argentine grains and meats.

value of the imports of agricultural implements in 1924 was almost 22 million dollars; of this the United States supplied about 80 per cent. The numbers of items received indicate the volume of this trade. In 1924 Argentina imported a total of 60,200 plows, 18,900 drills and planters, 14,300 harvesters, 9,250 mowers, 6,030 headers, 5,170 horse-rakes, 7,710 threshers and harvester-threshers, 1,110 shellers, and 1,750 tractors.

A number of factors favor a large import trade in these articles; the small production in Argentina owing especially to a lack of raw materials and power, and to some extent labor and capital; the small rural population making the use of all kinds of labor saving machinery desirable or even necessary; the level land and the fertile friable soil free from stones and boulders facilitating the use of large implements of all kinds; and the dry sunny autumn which permits the use of the large combined harvester-threshers.

It is estimated that, with the continued expansion of agriculture, the demand for farm implements will be about the average receipts of 1923 and 1924. The home-made products cannot to any marked degree replace the foreign articles, even with the protection of a high tariff barrier. The last three years have shown astonishing sales and no slackening of the demand is in sight.

#### AUTOMOBILES

One of the most striking developments in the Argentine import trade during the last decade has been that in automobiles. The receipts of cars increased from 1,500 in 1910 to 37,262 in 1924, and to 54,665 during 1925 (Fig. 31). The motor-vehicle as a means of transport gains in popularity every day. It is beginning to replace the carriage in most of the large cities and the horse on the *estancias*. The field for automotive transportation is being widened constantly by immigration, the betterment of rural conditions, road improvements, and favorable financial conditions in the rural districts.

The United States dominates the au-

tomobile market in Argentina, supplying about 97 per cent of all the cars imported. Twenty years ago it was unusual to see an American car on the streets amid the European makes but now one has to look long and hard to get a glimpse of a European car feeling its way among the maze of speeding American cars. The United States has gained control of the trade owing to improvement in styles and lines over the European, the cheap prices, excellent service, a well managed advertising campaign, and the interruption of the trade of European companies during the war. American agents were the first to inaugurate repair service in Argentina and as a result garages and service stations on the American plan, even to the feature of "aere libre", exist in every district of Buenos Aires and in almost every town of the country.

More than half the cars entering Argentina are of the light makes. The Ford and the Chevrolet comprise the bulk of the trade in this class. Of 27,261 cars imported during the first seven months of 1925, 11,700 were Fords. They go primarily into the rural districts, while the expensive cars find their market in the large cities. This does not mean that no high priced cars go into the country. The *estancia* owners usually purchase more than one car, generally three—one high priced closed car for family use, a high or medium priced five passenger touring car for ranch use, and a light car—Ford—for rough ranch use. The owners and overseers of these great estates now make their daily rounds over the rolling plains in cars instead of on horseback as in the days of old.

The annual requirement of automobiles in Argentina amounts to 45,000 to 50,000. This demand probably will be maintained, or even increased, for some years to come with a closer settlement of the country and the building of hard surfaced roads.

The use of motor trucks in Argentina is small; probably less than 6 per cent of the cartage of Buenos Aires is handled by



motor trucks; the ox, horse, and mule drawn cart or wagon as yet being the chief means of transportation other than railways. However, the quartering of draft animals in the chief cities becomes more expensive, in addition to being a public nuisance; the imports of trucks increased from 516 in 1922 to 8,066 in 1925. Most of the cities have stone pavements; hard surfaced roads now connect Buenos Aires with La Plata and Rosario, and others are being constructed. It appears that in Argentina there exists a rather large market for motor trucks of both light and heavy makes.

sumed to the extent of about 16 million dollars worth annually. In the northern part of the province of Misiones physical conditions favor the production of this commodity but the province lacks the necessary population.

While excellent physical conditions prevail in northern and northwestern Argentina for the production of good grade sugar, the country does not supply the domestic demand. However, it seems that this item before long will drop from the list of imports as sugar cultivation expands under favorable physical conditions, and an increased labor supply with larger immigration.

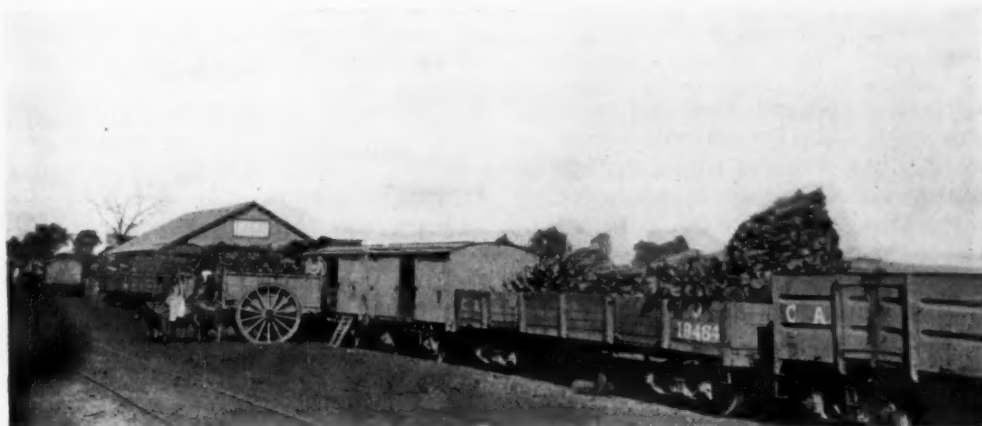


FIGURE 32.—The meagre forest resources of northern Argentina are being cut off at an amazing rate to supply the increasing demands for fuel in the Pampa to the south. Owing to the high price of imported coal in this part of the country, the locomotives burn wood, and charcoal is made and sent to the large cities for domestic use. As Argentina develops she must look to foreign sources for increasing quantities of coal for railways, ships and manufacturing industries.

#### FOOD PRODUCTS

Like most other classes of imports, food products include a long list of items, coming from all parts of the world. They consist almost entirely of commodities which Argentina cannot produce on account of climatic conditions or lack of population in the northern or sub-tropical part of the country.

Yerba mate, sugar and coffee lead in this class, yet the three comprise less than half the imports of food products and beverages. Yerba mate, a favorite beverage of the rural population in the northern half of the country, is con-

The imports and consumption of coffee, citrus fruits, cacao and other sub-tropical and tropical products will increase with the growth of population, the increase in wealth and the improvement of transportation, cold storage and marketing facilities.

#### PETROLEUM PRODUCTS AND COAL

The thousands of automobiles imported by Argentina each year operate on gasoline chiefly from overseas. Furthermore, fuel for the merchant marine, transportation purposes, and manufacturing, the greatest need of Argentina, comes almost entirely from foreign



FIGURE 33.—Imported purebred stock from the United Kingdom has been, during the past 35 years, a prime factor in the improvements of the herds of Argentina. Young high-grade cattle when finished off on alfalfa pasture dress into first class chilled beef for the English trade. Practically all (98½ per cent—378,448 metric tons in 1925) of the chilled beef exported from Argentina goes to the United Kingdom.

sources. At present Argentina produces little coal. The government works oil holdings in Comodoro Rivadavia at the south,<sup>4</sup> in the Neuquen-Mendoza region to the west, and in the Salta-Jujuy district to the north, yet the combined output equals not more than one-fourth of the total consumption. Also these fields in remote parts of the Republic are cut off from the industrial consuming centers by inadequate transportation facilities so that petroleum from the United States, Mexico and Peru can be laid down in Buenos Aires cheaper than the native product.

Petroleum products and coal constitute respectively 10 and 5 per cent of the value of the total imports of the country. Together they cost the Republic more than 100 million dollars per year. Yet they advance if the harvest of grain, meats and wool are to move from the plains to the ports, thence to the oversea markets.

Argentina, the leading petroleum consuming country of South America, must depend on foreign sources for petroleum products for some years to come. The United States dominates the trade in petroleum products, supplying about 80

per cent of the crude petroleum, 40 per cent of the fuel oil, 45 per cent of the gasoline, 73 per cent of the kerosene and appreciable quantities of lubricating oils and greases. Mexico and Peru hold nearly all the remainder of the trade in these commodities.

In contrast to the trade in petroleum, the Argentine coal trade is held by Great Britain, being able heretofore to undersell all competitors. British coal of high grade is produced near the sea. By serving as carriers of farm and animal products of Argentina to all parts of northwestern Europe, the British are able to bring coal as ballast at very low freight rates. The United States, on the other hand, must charge higher freight rates on coal than the British, because of the smaller movement of Argentine commerce to North America and the consequent disadvantage of our shipping in readily securing a return cargo. Also large purchases of British coal result in part from the immense investments of English capital in Argentine railroads, factories and slaughtering plants.

Argentina must continue to import coal, and in increasing amounts, as the railway net develops, the farms and ranges supply more of their products for the export movement, the inadequate forest

<sup>4</sup>The Comodoro Rivadavia fields in 1921 shipped 1,750,000 barrels of petroleum.

resources are exhausted (Fig. 32), and as new factories and new uses for fuel develop. Because of the distribution of export tonnage Great Britain stands in a position to retain the coal trade for years.

#### OTHER ITEMS

The character of the long list of minor imported articles suggests the many and growing wants of a relatively young and expanding agricultural country. As the country develops, her needs will increase in quantity and variety. While her population may not increase as rapidly as one might expect, the very fact of a one-sided development as a purely agricultural nation will make her an extremely active market for manufactured commodities. Since Argentina does not have the raw materials essential for manufacturing, she must look to the main industrial regions of the world for the bulk of her fabricated wares. Since the wealth of the country lies in the fertile soil of the plains, the imports will grow in proportion to the prosperity of the farmers and the cattle men, for they constitute the firm foundation of the Argentine Republic. Furthermore, as long as Argentine food products and raw industrial materials find a ready market in manufacturing regions, the country will be able to absorb those wares to the extent of her purchasing power.

#### COUNTRIES SHARING THE TRADE OF ARGENTINA

Though many countries share the trade of Argentina, five nations—Great Britain, the United States, Germany, France and Belgium—dominate the commerce. Those of western Europe take about eighty per cent of the exports and supply sixty-five per cent of the imports. The neighboring nations of South America play only a small part in the commerce of the Republic; they take less than eight per cent of the exports and furnish less than nine per cent of the imports.

#### UNITED KINGDOM

The United Kingdom supplies 23 per cent of the imports and takes from 23 to 35<sup>6</sup> per cent of the exports of Argentina. British control of the trade of Argentina is legitimate and natural. When the imperial Colonial power of Spain waned and was shaken off, the British were the first to enter the South American commercial field. In 1823 a British consul was sent to Buenos Aires; by the middle of the nineteenth century the British population in Argentina had reached thirty-two thousand and in 1870 forty thousand. Now it numbers more than 100 thousand.

From earliest times it has been English capital in the hands of Englishmen which has given the initial impetus to Argentine development and always impelled it to augmented momentum. English money has built the railroads, established the banks and loan houses, encouraged the breeding of fine horses, cattle and sheep, built many of the great slaughtering plants, and supplied merchandise suitable for use in all these great enterprises (Fig. 33). The British owned railroads of Argentina represent an investment of one billion dollars. The total investments of British capital in the country have been estimated at about two billion dollars. While British men and money form essential pillars of commerce with the Argentine, the natural resources are the bases upon which the structure of trade is being built.

England, a country with small agricultural resources, a score of great manufacturing industries, and a hungry population of millions of factory workers, has for more than a century looked to oversea sources for raw materials and

<sup>6</sup> The destination of Argentine exports cannot be accurately apportioned on account of the large shipments "on orders" (See Fig. 34). Twenty-six per cent of the exports of the country leave Argentine ports without definite orders. Ships thus leaving proceed to a port of call en route to Europe and receive by cable or wireless orders for the destination of cargoes. It is estimated that at least one-half of these shipments finally are dispatched to the United Kingdom.

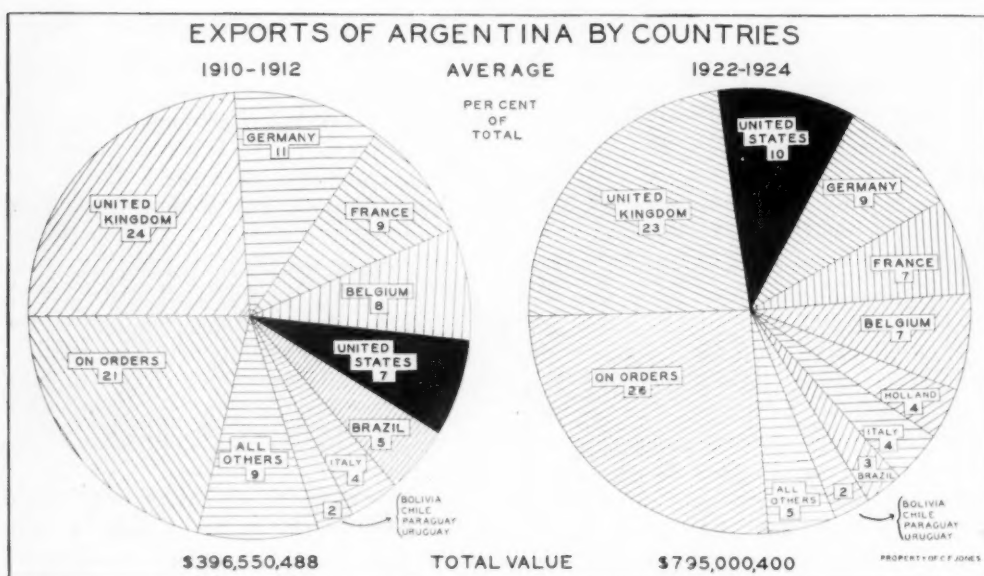


FIGURE 34.—Northwestern Europe takes about 80 per cent of the exports of Argentina. It is not possible to get the destination of all exports by countries because one-fourth of the shipments leave Argentina "on orders," the final orders being received by the ship in the Atlantic en route to Europe, since practically all shipments dispatched "on orders" are destined for European consumption. The position of the various countries in the trade, based on export statistics by destination, does not represent the true position of the countries. The United Kingdom, Germany, France, Belgium, Holland and Italy all share in the receipts of the products dispatched "on orders."

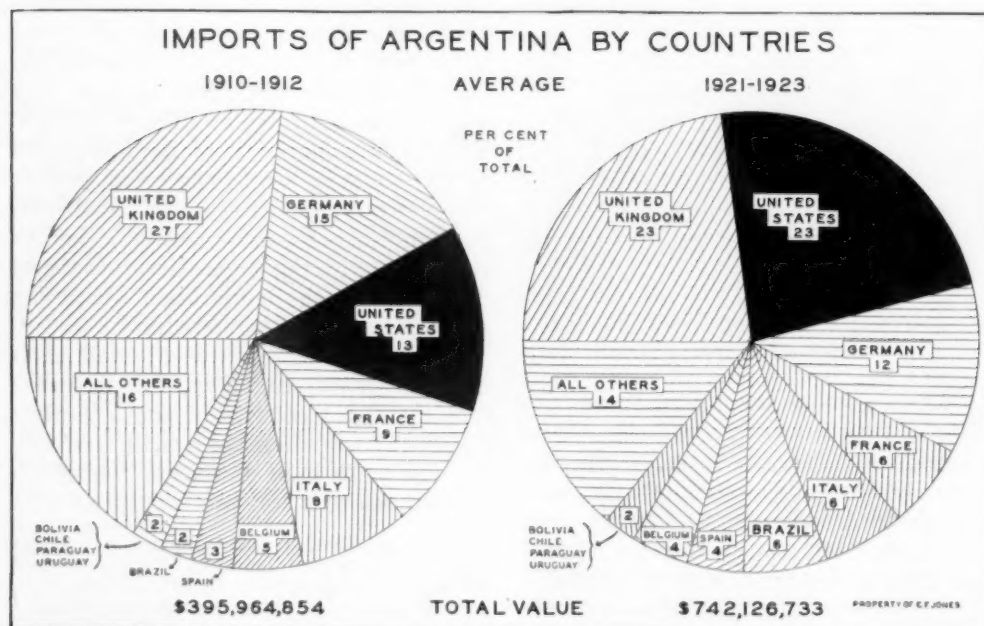


FIGURE 35.—Six countries supply seventy-six per cent of the imports of Argentina. The United States and the United Kingdom compete for first place. The former dominates the trade in agricultural machinery, automobiles and petroleum products, while the latter holds that in railway supplies, certain classes of textiles, and purebred stock. Argentina depends only to a small extent upon the sister Republics of South America, the intra-continental imports amount to only nine per cent of the total. Tropical or sub-tropical food products from Brazil and Paraguay count for most of this trade.



foodstuffs. On the other hand, Argentina has had the optimum conditions for supplying these commodities in increasing amounts as the demands of England grew and shifted from one region to another. Argentina has come to be one of Britain's chief sources of supply. Without her products England must suffer marked handicaps, but with them she moves on in the march of industrial nations, receiving raw materials and foodstuffs and selling manufactured wares in the marts overseas.

The United Kingdom is the leading buyer and consumer of Argentine wheat, corn, oats, linseed, chilled and frozen beef and mutton, butter, and wool, the chief export commodities of the Republic (Fig. 34). She sends in return textiles, clothing, general iron and steel goods, railway supplies, coal, jute bags, and miscellaneous manufactured wares. For wheat alone Great Britain pays Argentina nearly half as much as Argentina returns for all imports from the United Kingdom; and for beef, mutton, and butter she pays more than Argentina's total expenditure for British goods. Naturally, therefore, Great Britain looks for a reciprocation of these vast purchases proportionate to the requirements of the home country. While the United Kingdom has a fine economic and geographic basis for keeping a considerable part of this trade, she finds it increasingly difficult as the wants of other countries grow and as their factories turn out larger quantities of goods.

#### THE UNITED STATES

The United States at the present time occupies a strategic position in the import trade of Argentina, but is not so commandingly situated in the export trade of the Republic. Six commodities, wheat, corn, linseed, meats, wool, and hides, compose 84 per cent of the exports of Argentina. Since the United States is a large producer of all these and an important exporter of the first two, she competes with Argentina, and, therefore, the leading commodities of Argentina do

not find a ready market in the States. As a result the United States barely surpasses Germany in the export trade of the country.

Our imports from Argentina are linseed, wool, hides, and quebracho extracts and logs. Purchases of these items probably will increase. Our production and present imports of linseed will not be sufficient to satisfy the growing demand for linseed oil in paints. Wool, hides, and skins have become almost entirely by-products of the meat industry in the United States. As the States turn more and more to dairying and slaughter fewer cattle for meat, hides and skins, production per person will decrease markedly, and less developed countries will have to supply the demand. Sheep raising in the United States is on the decline—decreasing relatively to population growth and to requirements for wool and mutton. At present the United States uses as much wool from foreign as from domestic flocks. Woolen mills must depend to a greater degree upon overseas supplies, and no other country can produce these commodities to better advantage than Argentina.

During the last few years the United States has vied with Great Britain for first place in the import trade of Argentina, furnishing almost one-fourth of the total imports (Fig. 35). Before the war the United States held only 13 per cent of the import trade. The expected drop after the war in shipments of United States goods to Argentina did not materialize. The continued flow of American products to that country has been a cause of grave concern on the part of British firms, as they believed that a return to normal conditions in international trade would leave the United States trade about where it had been before the war.

The share of the commerce gained during the war has been retained on account of the high quality of American manufactured articles now being exported, to more direct relations between manufacturer and importer than was the

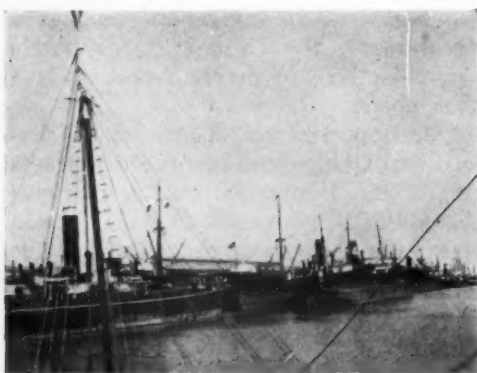


FIGURE 36.—Part of a fleet of twelve vessels at Santa Fe on the Paraná River, near the present northern margin of the cereal belts, loading grain for shipment to the manufacturing districts of western Europe, a region which will continue to be an expanding market for the products of the fertile farms of Argentina.

case in earlier years, to increased cost of production and consequently higher priced articles in Great Britain, and to the activities of American banking firms and the American investments in the packing plants and other enterprises in Argentina.

The United Kingdom almost monopolizes the large trade in railroad equipment and materials because of a billion dollar investment in that field, but the United States dominates in agricultural machinery and automobiles. American manufacturers have studied the types of implements and machinery suited to conditions in Argentina and have made the article desired. Since this country already produces and uses enormous quantities of farm implements, it can doubtless permanently excel European manufacturers, whose home market does not demand these types of machinery. The leading position of the United States in this trade is indicated by the fact that it supplies 80 per cent of the requirements of Argentina.

The dominant position of United States producers is even more striking in the case of the automobile business, for our firms supply 97 per cent of all the cars of the Republic. Superior styles, cheaper prices, better service, careful advertising and promptness of delivery

gained this trade position and point to its almost complete control by United States interest for years to come.

The United States has a practical monopoly in the trade of some items, but the great bulk of the textiles and miscellaneous imports will come largely from other sources. Argentina, the richest country in the world, per capita, is closely bound to Europe. The population is primarily of south European extraction; the Argentine citizen cares less for price than for attractiveness of design and novelty; he dresses according to Parisian and London styles. Consequently European luxury goods hold an advantage over those from the United States.

Furthermore, European investments in Argentina establish a bond of interest which it is difficult to break. While Argentina promises great development in farm and pastoral activities and while American requirements of these products will certainly increase as the United States advances as a manufacturing nation, Europe's demands far surpass those of the United States, and Europe's trade connections stand on a sound economic basis of exchange (Fig. 36). Therefore, United States business, to gain and hold trade in Argentina, must overcome strong competition in this most active commercial field.

#### GERMANY

Germany, which dropped to an insignificant position in the trade of Argentina during and following the World War, has been supplanted by the United States, but is regaining ground and ranks as a strong third, taking 9 per cent of the exports and supplying 12 per cent of the imports. The Germans buy heavily of grains, wool, hides, quebracho, and frozen meats, and send all kinds of articles in increasing quantities to Argentina. Germany, like England though to a smaller extent, depends upon foreign sources for raw materials and food-stuffs and sells in those regions numerous manufactured wares.

Hardware is among the leading articles sent to Argentina. It comprises for the most part cheap articles which retail in Buenos Aires at from one-third to one-half less than the price of American hardware of a similar type. Machinery shipments consist almost entirely of machine tools. The Germans dominate the trade in metal ware, kitchen utensils, toys, and school supplies. Large quantities of German chemicals and drugs find their market in Argentina. To regain some of the trade lost during the war, industrial leaders of Germany have proceeded along the lines in which they have been accustomed to move; they have exported "five and ten cent articles," cheap, low-grade goods, and have

vies with the others for fourth place. All three take appreciable amounts of the leading export of Argentina for either the factories, or the direct needs of millions of the people or both, and each specializes in products which find ready sale in Argentina. Belgium and Italy have entered the markets to a surprising extent with cheap grades of cotton and woolen goods and artificial silk. The former, highly industrialized, takes considerable quantities of Argentine foodstuffs and raw materials, while Italy seeks in the large Italian population in Argentina a valuable consuming market.

French exporters specialize in high-grade silk goods, novelties, notions for



FIGURE 37.—Argentina, with only one-third of her arable land in crops, stands in an excellent position with an increasing population to meet the augmented demands of western Europe for temperate foodstuffs and raw materials. With a larger industrial development in the United States, this country will look more and more to Argentina for raw materials and possibly foodstuffs, especially meats. Province, Buenos Aires. (Courtesy of H. G. Olds.)

courted the prospective buyer as heretofore, a procedure liked by most South Americans. However, in contrast to the past, most German manufacturers insist on remittance with order, thus removing one of their chief advantages before the war. It will be some time, if ever, before the Germans regain the place they once held in Argentine trade.

#### OTHER EUROPEAN COUNTRIES

France, Belgium, and Italy carry on important trade with Argentina; each

ladies, perfumery, fine leather goods and many other lines, where daintiness, care, and fine craftsmanship enter into the product. The people of all the chief cities of Argentina, especially Buenos Aires, look to France for this class of goods and for the latest in styles. In ladies' woolen dress goods, fine fancy woolens, silk and woolen mixtures, and dyed linen France does most of the business. With this trade well developed France stands a good chance of retaining her place in the commerce of the country,

as such trade usually runs in well defined channels.

#### INTRA-CONTINENTAL TRADE

Argentine commerce with other countries of South America is negligible, for they too are primarily producers of foodstuffs and raw materials for the great manufacturing regions of the world. Neighboring countries take less than eight per cent of the exports and supply less than nine per cent of the imports. These consist almost entirely of beverages and foodstuffs—yerba mate, coffee, sugar and citrous fruits from Brazil and Paraguay on the one hand and wheat flour, wines and meats from Argentina on the other—a trade based primarily on differences in climatic conditions and one which should increase with the development of the contrasted countries.

#### SIGNIFICANT TRENDS AND TRADE POSSIBILITIES

The whole economic status of Argentina is reflected in the figures of exports and imports. Its commercial centers, railroads, river traffic, ports, industrial enterprises, and the finances of the government all depend for their prosperity upon the fluctuations of the foreign commerce.

The products of the farm and the range have dominated the export trade, while manufactured wares have characterized the imports, because Argentina is purely an agricultural country. Along pastoral and agricultural lines the future of the country lies. With only about one-third of the total arable area under cultivation, the country must be considered as in transition from a relatively secondary but important rank in farm and range products to a premier position.

Yet a number of factors present conditions which are unfavorable to an early realization of the full possibilities of the country. Facilities for handling crop products are far from adequate. The lack of grain elevators compels the hand-

ling of all grain in bags from the machine to the steamer (Fig. 37). The absence of sheds and cribs in the country districts and the inadequate rail facilities allow much grain to spoil in unusually wet seasons.

Thousands of immigrants enter the country annually yet the population is far too sparse to cultivate the available land. Thousands of laborers must be brought in each year to harvest the crops. This migrant labor from southern Europe, chiefly Italy, amounts to as many as 180,000 per year. It will be some time before an adequate supply of labor is available in the Pampa on account of the enormous land holdings, which persist because: (1) they are too far away from transportation to make crop raising as profitable as grazing; (2) they give profits from a sheep or cattle industry on a huge scale sufficient to satisfy all desires; (3) they increase the wealth of the owner enormously by the rise of land values. Of all problems facing the Republic the distribution of land is probably the most serious, for the great *estancias* present many intricate questions as yet unsolved. As long as these estates exist extensive agriculture will continue and much of the more fertile land will remain untilled.

Drought and locust plagues discourage farming in certain new sections and affect vitally crop production in all the northern half of the country, but the drought factor presumably will be somewhat overcome as farming methods improve, and the serious losses from locusts will become less critical as tillage is extended over the breeding areas now untilled.

The manufacturing industries of the Republic will grow in variety and value, but any considerable development, aside from the elaboration of some farm and range products, appears improbable. Manufacturing industries will ever remain a small part of the national wealth. A serious lack of fuel, water, iron and other minerals, handicaps vitally all industrial enterprises. Thus Argentine life seems destined for a long time to continue in the channel that it has pur-



sued in the past—an exchange of the products of its farms and ranges, either in the raw state or as partially prepared commodities, for manufactured wares from the leading industrial nations of the world. On the other hand, Argentina

has only begun to realize upon her greatest resource—fertile plains. She stands upon the threshold of a period of power and position in the family of nations. Her growth in influence and wealth as the years pass may startle the world!

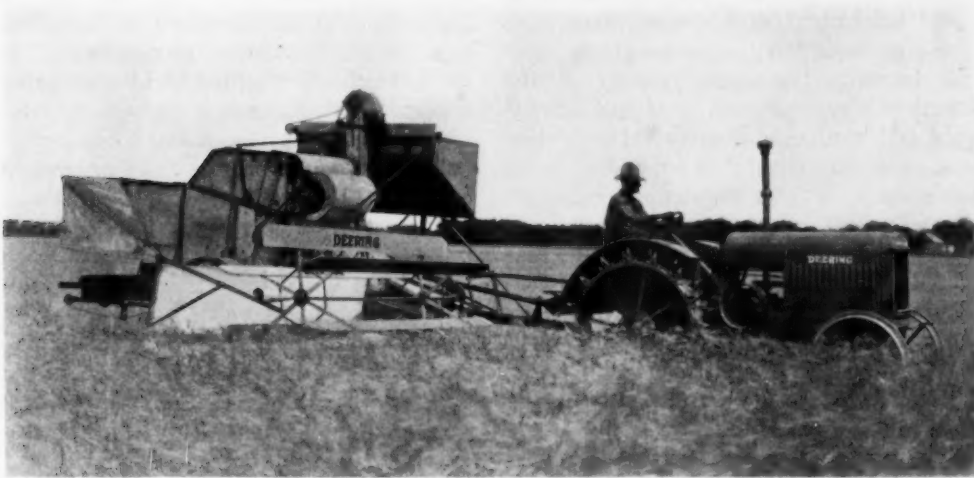


FIGURE 38.—With millions of acres of arable land untilled, the extensive use of large machinery and a relatively small consumption, Argentina stands on the threshold of a period of power and progress in the world's trade in farm and range products. (Courtesy of International Harvester Co.)

## THE FOREST RESOURCES OF CANADA

*Roland D. Craig*

Forest Engineer, Dominion Forest Service

THE economic and industrial development of Canada has always been intimately associated with the forest. The early history of the country is replete with stories of adventure and hardship in the dense unbroken woods which the pioneers found upon her shores. It was from the forests that the intrepid voyageurs secured the fur which was the first commercial product of the country, but to the early settlers they were a serious impediment to their agricultural efforts, as well as a menacing shelter to their Indian enemies. However, they provided an abundance of fuel and building material.

Though some shipments of timber, masts and spars were made to France as early as 1667, the wood was of very little commercial value until the beginning of the 19th century, when a trade in square timber developed with England. By

1864 the timber trade had developed to the extent that it required 1,350 sailing vessels to transport from Quebec 20 million cubic feet which had been floated down the St. Lawrence and its tributaries. From that time onward, the forests have continued to be a most important factor in Canadian trade and industry.

In the value of production, the forest industries rank second only to agriculture, have twice the value of the mines and ten times the value of the fisheries. The pulp and paper industry is at present the most important manufacturing industry in Canada, contributing annually \$182,000,000 to the national production. The lumber industry is not far behind with \$126,000,000 and the other products, such as railway ties, poles, logs and square timber, bring the total value of forest products to \$365,000,000, to which \$75,000,000 is added by further



FIGURE 1.—The Forest Regions of Canada. Except for the treeless tundra most of Canada is forested. Only a small section in the south-central western portion is prairie.

manufacture into finished products, such as doors, furniture, cooperage, etc.

Since Confederation, forest products have supplied 18.5 per cent of Canada's exports and at the present time are providing 22.6 per cent, showing a favorable trade balance of over \$210,000,000.

The value of the forests to Canada is not confined to the primary wood products, since practically every phase of the

ameliorating influence on the climate and the conservation of soil moisture.

The water powers with which Canada is so abundantly supplied and which are now considered one of the principal natural resources, are to a very large extent dependent for the control of the stream flow on the forest cover on the watersheds. A cheap and handy supply of timber is an important factor in the de-

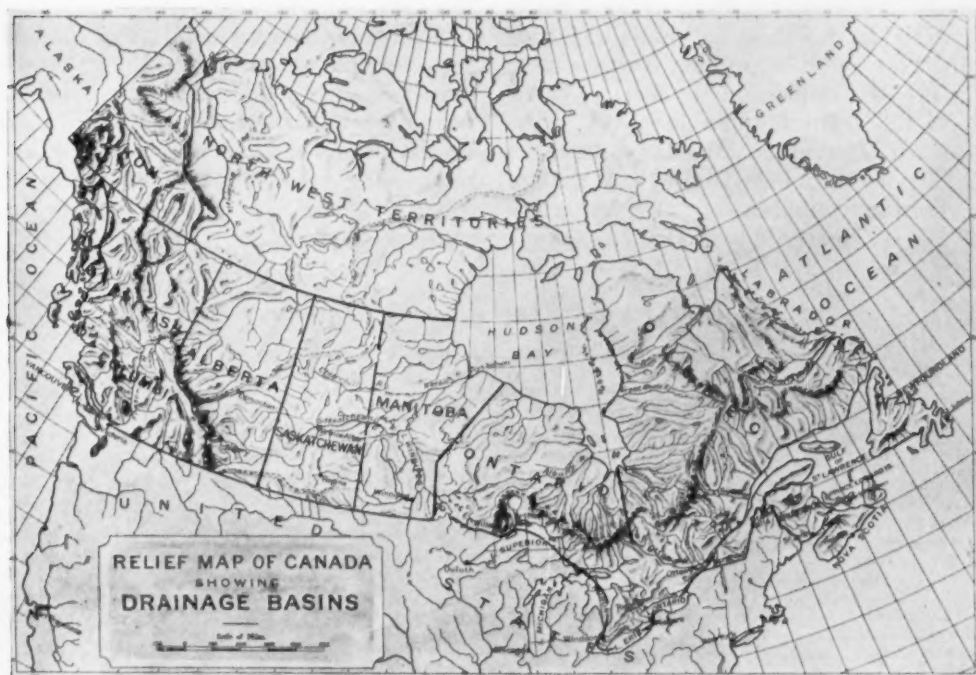


FIGURE 2.—Map to show relief of Canada. Comparison of this figure with Figure 1 reveals the relation of relief to forest distribution. (Adapted from map supplied through courtesy of Water Power and Reclamation Service.)

industrial life of the Dominion is dependent to a greater or less extent on the maintenance of their productivity. Agriculture is benefited perhaps as much as any industry by the forests. The farmers' woodlots yield \$72,000,000 annually, which is more than the value of all the fruit and vegetables produced, and the winter employment afforded by the logging camps is of very great assistance to the farmers, especially in northern Ontario and Quebec and in the Maritime Provinces. The greatest benefits of the forests to agriculture are, however, the

development of the mines, and in fact wood is an essential material in practically every manufacturing industry.

One-fifth of the railway freight traffic is supplied by wood and wood products and "the lure of the north woods" is responsible for a large share of the tourist traffic, which it is estimated brings into the Dominion from foreign countries over \$135,000,000 annually.

#### FOREST RESOURCES

The Dominion of Canada covers an immense area, some 3,729,665 square miles, of which approximately 3,600,000

square miles is land and the balance fresh water lakes and rivers. About one-third of the land area is essentially forest land, unsuitable for agriculture, but capable of producing wood crops. It is estimated that of this 460,000 square miles carries merchantable timber and on 748,000 square miles the timber is either inaccessible or too small for present use.

The saw timber resources are estimated at 482 billion board feet and the smaller material suitable only for pulpwood, fuel, posts, etc., at 1,280 million cords, a total of 246,826 million cubic feet. Of the total 108,212 million cubic feet is in the Eastern Provinces, 56,423 million in the Prairie Provinces and 81,657 million in British Columbia, but three-quarters of the saw material is in British Colum-

bia. Only about one-half of the total stand can be considered as commercially accessible at the present time, but with the opening up of new transportation facilities, the development of new industries and the increase in the price of forest products, the limit of "accessibility" is being enlarged.

Extending 3,000 miles from the Atlantic to the Pacific and 1,500 miles north to the Arctic Ocean, the Dominion embraces a variety of physiographic and climatic conditions which have a marked influence on the tree growth. Though predominantly coniferous, the arborescent flora includes about 160 hardwood or deciduous species and only 31 coniferous or softwood species. Only 23 softwoods and 32 hardwoods can be considered of commercial importance.

#### AREAS OF AGRICULTURAL AND FOREST LAND IN CANADA BY PROVINCES

Estimated 1925

	FOREST LAND					
	<i>*Unprofitable or</i>			Total	Other Land	Total Land Area
	Agricultural	Merchantable Timber	Inaccessible			
	Sq. Miles	Sq. Miles	Sq. Miles			
Prince Edward Island .....	1,700	300	.....	300	184	2,184
Nova Scotia .....	3,800	3,720	11,030	14,750	2,518	21,063
New Brunswick .....	6,670	18,575	1,900	19,475	1,692	27,837
Quebec .....	40,000	200,000	300,000	500,000	150,865	690,865
Ontario .....	60,000	75,000	165,000	240,000	65,880	365,880
Manitoba .....	57,330	27,600	110,000	137,600	37,026	231,926
Saskatchewan .....	113,000	25,000	24,775	49,775	74,863	237,638
Alberta .....	129,400	60,000	26,650	86,650	32,498	248,548
British Columbia .....	20,700	50,000	100,000	150,000	182,716	353,416
Territories .....	.....	1,000	9,000	10,000	1,404,353	1,414,353
Total .....	432,600	460,195	748,355	1,208,550	1,952,595	3,593,745

Percent of total land area, 12.

\* Includes young growth not of merchantable size.

#### ESTIMATED STAND OF MERCHANTABLE TIMBER IN CANADA BY REGIONS

Region	Saw Material		Pulpwood, Cordwood Posts, etc.		Total
	1,000 Ft.	1,000	1,000	1,000	
	B. M.	Cu. Ft.	Cords	Cu. Ft.	Cu. Ft.
Softwood:					
Eastern Provinces .....	76,111,000	16,668,309	552,210	64,608,570	81,276,879
Prairie Provinces .....	17,985,000	3,938,715	272,010	31,825,170	35,763,885
British Columbia .....	345,762,000	75,721,878	47,500	5,557,500	81,279,378
Total .....	439,858,000	96,328,902	871,720	101,991,240	198,320,142
Hardwood:					
Eastern Provinces .....	32,084,500	7,026,507	209,565	19,908,675	26,935,182
Prairie Provinces .....	9,305,000	2,037,795	196,010	18,620,950	20,658,745
British Columbia .....	788,000	172,572	2,160	205,200	377,772
Total .....	42,177,500	9,236,874	407,735	38,734,825	47,971,699
Grand Total .....	482,075,500	105,574,505	1,279,705	141,251,827	246,291,841



The following table shows a number of species grouped generically, as detailed information is not available for the individual species.

## COAST BELT

The Coast belt covers the western slope of the Coast and Cascade mountains and the islands along the Pacific

## ESTIMATED FOREST RESOURCES OF CANADA—BY SPECIES

SPECIES	SAW MATERIAL		PULPWOOD, FUELWOOD, TIES, POLES, POSTS, ETC.		TOTAL Equivalent in Standing Timber
	1,000 B. Ft.	1,000 Cu. Ft.	Cords	1,000 Cu. Ft.	1,000 Cu. Ft.
<b>Softwood:</b>					
White Pine.....	17,475,000	3,827,025	38,974,000	4,559,958	8,386,983
Red Pine.....	3,955,000	866,145	13,955,000	1,632,735	2,498,880
Jack Pine.....	18,259,000	3,998,721	215,876,000	25,257,492	29,256,213
Western Yellow Pine.....	4,000,000	876,000	1,000,000	117,000	993,000
Larch.....	3,343,000	732,115	6,070,000	710,190	1,442,305
Douglas Fir.....	75,400,000	16,512,600	3,200,000	374,400	16,887,000
Spruce.....	115,364,000	25,264,715	382,762,000	44,783,154	70,047,869
Balsam.....	48,022,000	10,516,820	163,320,000	19,108,440	29,625,260
Hemlock.....	67,943,000	14,879,518	10,813,000	1,265,121	16,144,639
Cedar.....	82,097,000	17,979,243	34,750,000	4,065,750	22,044,993
Yellow Cypress.....	4,000,000	876,000	1,000,000	117,000	993,000
Total.....	439,858,000	96,328,902	871,720,000	101,991,240	198,320,142
<b>Hardwood:</b>					
Yellow Birch.....	10,405,000	2,278,695	30,690,000	2,915,550	5,194,245
White Birch.....	5,425,000	1,188,075	57,340,000	5,447,300	6,635,375
Maple.....	6,206,000	1,359,115	27,207,000	2,584,665	3,943,780
Beech.....	1,835,500	401,975	7,534,000	715,730	1,117,705
Basswood.....	1,106,000	242,214	3,180,000	302,100	544,314
Ash.....	551,000	120,669	2,210,000	209,950	330,619
Elm.....	894,000	195,786	2,470,000	234,650	430,436
Oak.....	197,000	43,143	614,000	58,330	101,473
Alder.....	.....	.....	50,000	4,750	4,750
Aspen or Poplar.....	14,770,000	3,234,630	276,440,000	26,261,800	29,496,430
Cottonwood.....	788,000	172,572	.....	.....	172,572
Total.....	42,177,500	9,236,874	407,735,000	38,734,825	47,971,699
Grand Total.....	482,035,500	105,565,776	1,279,455,000	140,726,065	246,291,841

## CLASSIFICATION OF FOREST TYPES

The forests of Canada may be divided into three main geographic groups, the Cordilleran, the Great Plains and the Eastern regions in each of which there are distinctive belts which are dependent primarily on the physiographic and climatic conditions. These belts contain numerous forest types which are largely the result of local soil or climatic conditions.

## CORDILLERAN REGION

This region includes the Rocky Mountains and the country lying to the west of these mountains and contains the Coast belt, Interior Dry belt, Interior Wet belt, the Rocky Mountain belt, and the Sub-Arctic belt.

coast. It is favored with a mild temperature and a precipitation of from 40 to 120 inches which is conducive to a heavy growth of coniferous timber. The various types follow mainly altitudinal or latitudinal zones.

## Douglas Fir-Red Cedar

In the southern portion of the Coast belt, the Douglas fir-western red cedar type generally extends from sea level to 2,000 or 2,500 feet altitude. Towards the northern limit the altitudinal range decreases. Associated with the principal species are western hemlock, western white pine, and balsam fir (lowland fir and amabilis fir).

## Red Cedar-Western Hemlock

As the Douglas fir disappears from the stands toward the north or at higher altitudes, the forest changes to a red cedar-hemlock type with amabilis fir and yellow cypress as subsidiary species. This type descends to sea level between Knight's inlet and Rivers inlet on the mainland and Barkley sound and Quatsino sound on Vancouver Island. It has an altitudinal range of from 1,500 to 3,000 feet above sea-level.

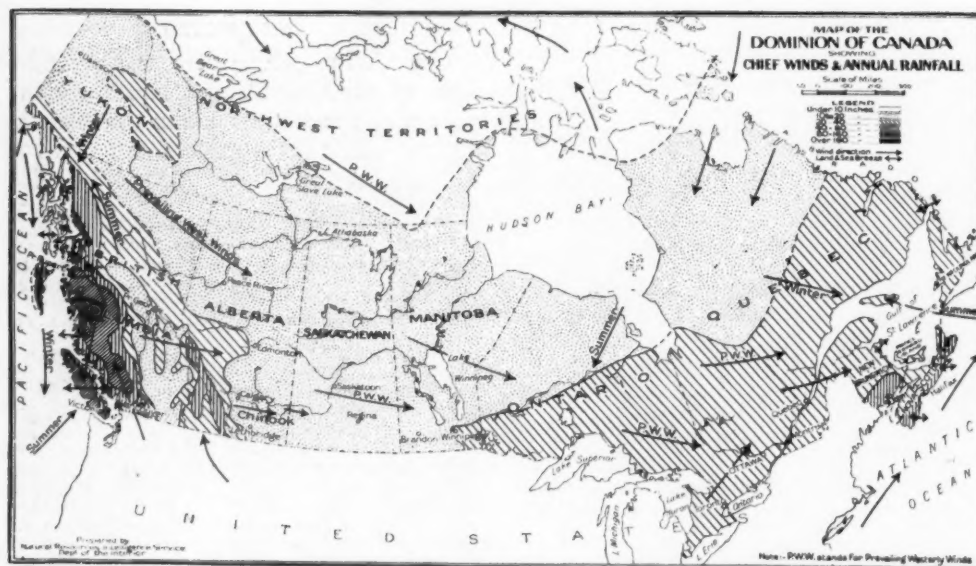


FIGURE 3.—Map of chief winds and annual rainfall of Canada, to indicate, by comparison with Figure 1, the close relation between these features of climate, and the distribution and character of Canadian forests. (Courtesy of Natural Resources Intelligence Service.)

#### *Western Hemlock-Sitka Spruce*

The western hemlock-Sitka spruce type is a lowland type prevalent in the northern portion of the Coast Belt between Rivers inlet and Portland canal and especially on the Queen Charlotte Islands. It also occurs on well watered situations along valley bottoms within the range of the Douglas fir.

#### *Western Hemlock-Amabilis Fir*

Occupying a climatic zone somewhat less favorable than the red cedar-hemlock or the hemlock-Sitka spruce types, the hemlock-amabilis fir type occurs either on higher or more exposed or wetter sites. It has an altitudinal range of from 1,500 to 3,500, or in some situations 4,000 feet. It is not present on the Queen Charlotte Islands.

#### *Sub-Alpine and Muskeg*

At higher elevation between the merchantable timber line and the cold timber line there is a sub-alpine type of stunted tree growth, composed chiefly of mountain hemlock, yellow cypress, and alpine fir, with occasionally red cedar, lodgepole pine or white-barked pine. A similar type is found on very wet or exposed situations at lower elevations along the coast.

#### *Deciduous*

On the alluvial bottomlands of many of the larger valleys, stands of black cottonwood occur. It is associated with alder and broad-leaved maple. This is typically a pioneer type on newly formed land.

### INTERIOR DRY BELT

This belt lies between the Coast-Cascade Mountains and the Columbia and Rocky Mountain systems but extends through the valleys in the southern portion of the Monashee, Selkirk and Rocky Mountains to the Crowsnest Pass.

#### *Treeless*

In the lower portions of the valleys in the southern part of the Interior Plateau, there is a treeless type characterized by a growth of sagebrush (*Artemisia tridentata*) in the driest situations in the bottoms of the valleys and by bunch grass (*Agropyron spicatum*) on the higher mountain sides and benches. The land is very fertile when irrigated and the bunch grass provides excellent grazing.

#### *Yellow Pine*

Bordering on the grass lands, open park-like stands of western yellow pine occur, becoming denser as the elevation and moisture increase until fairly dense stands develop. This type usually occurs at altitudes between 1,500 and 2,500 feet above sea level, but may extend to 3,000 feet on southern exposures.

#### *Interior Douglas Fir*

As the altitude increases, Douglas fir gradually becomes more prominent in the yellow pine type until it becomes predominant. It extends to elevations 3,500 to 4,500 feet. It also extends north as far as Quesnel. The Douglas fir of the Interior differs markedly from that of the Coast belt. It is smaller, shorter boled, and more limby, and is much harder when subjected to extreme climatic conditions.

#### *Western Larch*

In the southeastern part of the Interior Dry belt, this type covers a limited area, usually between the yellow pine and Douglas fir types and it is usually mixed with either Douglas fir or yellow pine. Forest fires have played an important part in the formation of this type, since the thick bark of the larch makes it more resistant to fire than the concomitant species.

#### *Engelmann Spruce*

At the upper altitudinal and latitudinal limits of the Douglas fir type, the Engelmann spruce type develops. This type merges into a spruce-alpine fir type and finally the sub-alpine type. It is the principal type in the northern part of the Interior Plateau system, the Engelmann spruce being replaced by white spruce in the north.

*Lodgepole Pine*

As a result of repeated fires, lodgepole pine has replaced the original forests to a very considerable extent in the Douglas fir and Engelmann spruce types, and has also encroached on the yellow pine type. The transformation has been so extensive and so complete that lodgepole pine must be considered as an established type from a managerial aspect. In many places reproduction of Douglas fir and Engelmann spruce is present under the lodgepole pine, giving promise, if afforded protection from fire, of the final reversion to the climax type.

## INTERIOR WET BELT

This belt is confined to the Columbia system and the Rocky Mountain trench where the precipitation is heavier than in the Dry belt and the types resemble those in the Coast belt.

*Interior Red Cedar*

In the wetter situations in the valleys, red cedar becomes the predominating species. In the southern portion of the belt it is associated with Douglas fir, Engelmann spruce, western white pine, hemlock, larch, lowland fir, alpine fir and cottonwood. Farther north, Alpine fir and Engelmann spruce become more prominent and the other species drop out of the type.

*Red Cedar-Hemlock*

On the benches and lower slopes of the valleys in the southern portion of the Interior Wet belt, red cedar, hemlock and Douglas fir are the principal species. The altitudinal range of this type is between 3,000 and 4,000 feet.

## ROCKY MOUNTAIN BELT

This belt covers both sides of the Rocky Mountains, merchantable timber extend-



FIGURE 4.—Douglas fir on Vancouver Island, part of the coast forest belt, where some of the finest stands of timber in the world may be found.



FIGURE 5.—The Douglas fir-red cedar type, from which some of the best lumber is obtained. (Courtesy Dominion Forest Service.)

ing to altitudes of 5,000 to 6,000 feet in the southern portion and 3,000 to 4,000 feet in the north. Absolute timber line is generally 800 to 1,200 feet above the merchantable timber line.

*Spruce*

The forests of the lower slopes were originally largely composed of Engelmann spruce or in some places white spruce, but as a result of fire, lodgepole pine has to a considerable extent replaced the spruce. Alpine fir becomes increasingly prominent at higher altitudes until it dominates the type. Douglas fir is also found in this type at lower elevations.

*Lodgepole Pine*

Over large areas lodgepole pine has become established to the practical exclusion of other species and though the tendency is for the forests to revert to the climax type the recovery will be so slow that from the standpoint of forest management, it must be considered more or less permanent.

## GREAT PLAINS REGIONS

The Great Plains region includes the country between the Rocky Mountains and Hudson Bay. There are no great variations in altitude, and soil and climatic conditions are the determining factors in the distribution of the forest types. The region may be divided into the Prairie, Northern Forest and Sub-Arctic belts.

## PRAIRIE BELT

In the southern portion of the provinces of Alberta, Saskatchewan and Manitoba, there is a vast area extending north of the International Boundary for 200 to 400 miles which is practically a treeless prairie. The occurrence of scattered patches of tree growth adjacent to natural fire breaks, such as streams and hills, would indicate that fires have been responsible to a large extent, if not entirely, for the present treeless condition of this area. Aspen is the most prevalent species in these "bluffs" that remain, but in some places white spruce and jack pine occur. The land in this belt is of value primarily for agriculture.

## NORTHERN FOREST BELT

North of the Prairie belt there is a forest belt 300 to 400 miles wide with an

*Black Spruce*

Black spruce, either pure or associated with eastern larch (tamarack) is found on poorly drained lands which comprise a considerable proportion of the area.

*Jack Pine*

Like lodgepole pine to which it is closely related, jack pine has gained ascendance over the spruce through the agency of fire. In some situations, especially on the lighter soils, it has formed a permanent managerial type, but on others it may be considered a temporary type.

*Intolerant Hardwood*

So severely have the coniferous forests suffered from fire that aspen has become the most prevalent species throughout the northern forest belt. Though it will certainly be replaced by conifers where there is a possibility of securing reproduction of these species, over vast areas there is no immediate prospect of securing a coniferous forest by natural agencies. In the eastern portion of the belt, white birch is frequently associated with the aspen, and on moist situations, such as along streams, balsam poplar occurs.

## SUB-ARCTIC BELT

In the northern part of the Great Plains region, open tundras become more prevalent and tree growth is confined to narrow strips bordering the waterways.



FIGURE 6.—Red cedar-hemlock type of forest near Grenville, British Columbia. It forms a valuable commercial forest.

intervening transition zone, partly prairie and partly forest. The Northern Forest belt covers the Archaean rocks and the soil is not suited to agricultural development.

*White Spruce*

From a commercial standpoint, the most important type in these forests is the white spruce type. Though it has been decimated by fire, most of the logging operations are conducted in this type. Under natural conditions it occupies the heavier well drained soils. Balsam fir is frequently associated with white spruce, especially in the eastern portion of the belt.

The occurrence of trees 12 to 16 inches in diameter, even as far north as Fort McPherson (Lat.  $67^{\circ} 25''$  N.), would indicate that soil conditions and perhaps fire have had more influence than climatic conditions in the limitation of forests.

As we go north, balsam fir early disappears from the forest. It is followed by balsam-poplar, jack pine, aspen and



white birch, the most persistent species being white spruce, black spruce, tamarack and willow. The northern limit of tree growth may be roughly indicated by a line drawn from the mouth of the Mackenzie River on the Arctic Ocean to the mouth of the Churchill River on Hudson Bay, and across the Labrador peninsula at about 58 degrees N. latitude.

The timber in the Sub-Arctic belt, though of little importance from the standpoint of forest industries, is of great value as a source of supply for local needs and for the protection of game and fur bearing animals.

#### THE EASTERN REGION

This region includes the provinces of Ontario, Quebec and New Brunswick, Nova Scotia and Prince Edward Island. Several belts with distinct characteristics are recognized, the Carolinian, Acadian, Tolerant Hardwood, Mixed Hardwood-

Softwood, Transition, Northern and Sub-Arctic belts.

#### CAROLINIAN BELT

This zone is confined to the southwestern portion of Ontario bordering on Lake Erie and the western part of Lake Ontario. It is characterized by the presence of several species of hardwoods, seldom or never found elsewhere in Canada. These are the tulip tree (*Liriodendron Tulipifera*), sycamore (*Platanus occidentalis*), sassafras (*Sassafras variifolium*), chestnut (*Castanea dentata*), black gum (*Nyssa silvatica*), papaw (*Asimina triloba*) and black walnut (*Juglans nigra*).

It is primarily an agricultural region and the remaining forests are in farmers' woodlots.

#### TOLERANT HARDWOOD BELT

North of the Carolinian zone from the southern end of the Georgian Bay to the Eastern townships in Quebec, the forests were composed primarily of such hardwoods as maple, elm, beech, basswood, ash, yellow birch, oak, hickory and butternut, which are classed as tolerant on account of their shade enduring abilities as contrasted with the light-demanding species, poplar and white birch.

Coniferous types composed of pine, spruce, balsam and cedar occur within these two hardwood belts, but are usually confined to swampy or light soils. The land throughout this belt is of high agricultural value and only remnants of the original forests are found in farmers' woodlots.

#### ACADIAN BELT

The Acadian belt includes the Maritime Provinces and the south shore of the St. Lawrence River in Quebec. It is characterized by the occurrence of red spruce and the forests resemble those of the states of Maine, Vermont, New Hampshire and New York. White spruce is present in these forests, but it is not so prevalent as red spruce. The principal forest types in this belt are the



FIGURE 7.—Lodgepole pine, replacing Douglas fir on fire-swept tracts. A clean, beautiful growth. (Courtesy of Dominion Forest Service.)

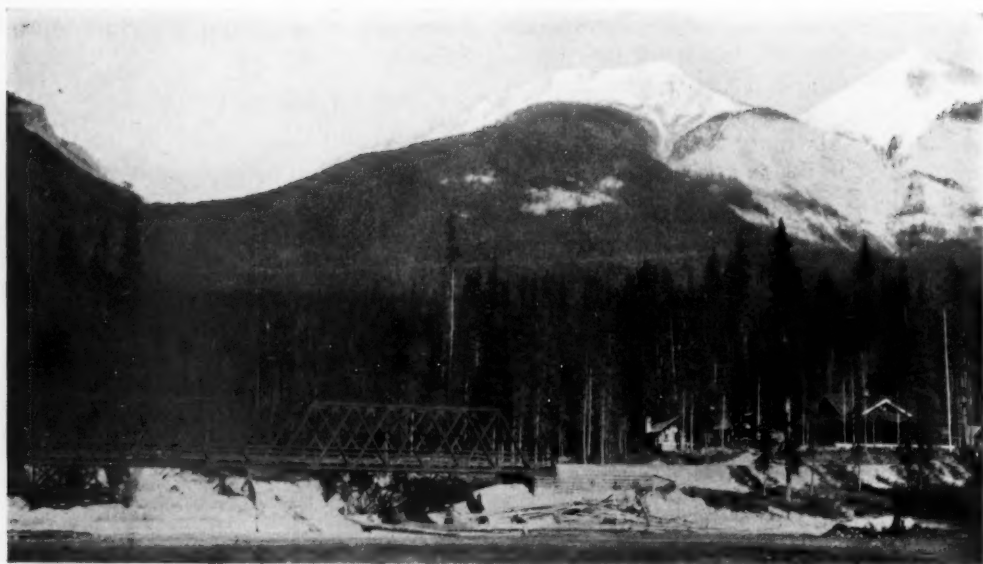


FIGURE 8.—Engelmann spruce-Lodgepole pine type of forest in the Rocky Mountain Belt. (Courtesy of Dominion Forest Service.)

spruce-balsam fir type, the tolerant hardwood type, the mixed hardwood and softwood type in which white pine and hemlock occur, and the black spruce and cedar types which occupy the poorly drained sites. The temporary intolerant hardwood type of aspen and white birch and the jack pine type are prevalent on burned-over areas.

#### MIXED HARDWOOD AND SOFTWOOD BELT

Adjoining the Hardwood belt is a mixed Hardwood-Softwood belt which extends to a line running roughly from the northeast corner of Lake Superior to the mouth of the Saguenay River on the St. Lawrence. It is in this belt that the white pine reached its maximum development, and though since the beginning of the lumber industry in Canada this region has been the centre of the most extensive exploitation, it still occupies a premium position in forest production in eastern Canada.

The character of the forests in this belt has been greatly altered by cutting and fire. The valuable pines to a larger extent have been replaced by spruce, balsam fir, jack pine and hardwoods. The forests in this belt contained a great



FIGURE 9.—White spruce and poplar, Northern Saskatchewan, fine pulpwood material. (Courtesy of Dominion Forest Service.)

number of species, comprising several types which are determined primarily by soil conditions.

*Pine*

Red pine is frequently but not always associated with white pine in this type. On light soils pure stands of pine occur but on heavier soils there is usually an admixture of shade-tolerant species, such as spruce, hemlock and yellow birch, maple, beech, basswood and other hardwoods which occupy a minor position in the stand. The exclusive cutting of pine, which until recently has been generally practised in these forests, has resulted in the displacement of pine by the concomitant species.

*Tolerant Hardwood*

Almost pure stands of hardwood composed of maple, yellow birch, elm, ash, basswood, beech etc., are becoming more widely established. Under undisturbed conditions, "hardwood ridges" carrying chiefly maple and yellow birch occur throughout this belt.

*White Spruce-Balsam Fir*

This type, though common in the virgin forests, has become more prevalent since the removal of the pine and on account of its value as pulpwood is now the most valuable type in this belt.

*Black Spruce*

Black spruce, frequently associated with tamarack and white cedar forms the typical stands of the swamps and low ground.

*Jack Pine*

Fire has resulted in the establishment of Jack pine over very considerable areas in this belt. In some cases it is only a temporary type but in others it has taken almost complete possession, especially on light sandy or gravelly soils. The value of jack pine for railway ties and pulpwood and the ease with which it can be grown, render it not an undesirable species to perpetuate.

*Intolerant Hardwood*

Aspen and white birch comprise a widely distributed fire type, which is for the most part temporary in character, since coniferous reproduction is generally present and will eventually dominate these short-lived species.

## TRANSITION BELT

Between the northern limit of the tolerant hardwoods and the height of land separating the St. Lawrence and the Hudson Bay drainage areas, and including the Lake of the Woods drainage area in Western Ontario, there is a forest belt which resembles the Mixed Hardwood-Softwood belt, except that the tolerant hardwoods are absent. White pine, red pine, white spruce and balsam fir are normally the prevailing species, but jack pine and intolerant hardwood types are prominent on old brulés, and black spruce and tamarack in the swamps.

## NORTHERN FOREST BELT

North of the height of land, the forests change to the northern forest types

similar to those in the Great Plains region. Though white and red pine do occur for some distance north, they are relatively an unimportant factor in the forests. Black spruce becomes more prevalent owing to the extensive areas of poorly drained lands. Jack pine is plentiful on higher and drier sites and the aspen-white birch type is widely distributed, the proportion of white birch increasing towards the east.

## SUB-ARCTIC BELT

The forests for approximately 100 miles south of Hudson Bay belong to the Sub-Arctic belt and are for the most part confined to the better drained lands along the rivers. They are of the same composition as in the northern part of the Great Plains.



FIGURE 10.—Chuting logs on Vancouver Island, an easy method of getting the logs to water transportation. (Courtesy of Dept. of Trade and Commerce.)

The principal species from a commercial or a botanical standpoint in the various regions are as follows:

## CORDILLERAN REGION

Common Name	Botanical Name	Range
Douglas fir	<i>Pseudotsuga taxifolia</i>	Southern portion
Western red cedar	<i>Thuja plicata</i>	Coast and Interior Wet Belts
Yellow cypress	<i>Chamaecyparis nootkatensis</i>	Coast belt
Sitka spruce	<i>Picea sitchensis</i>	Coast belt
Engelmann spruce	<i>Picea Engelmanni</i>	Interior belt
White spruce	<i>Picea canadensis</i>	Rocky Mountain and Northern Interior plateaux
Black spruce	<i>Picea mariana</i>	Rocky Mountain and Northern Interior plateaux
Lowland fir	<i>Abies grandis</i>	Southern Coast and Interior Wet belt
Amabilis fir	<i>Abies amabilis</i>	Coast belt
Alpine fir	<i>Abies lasiocarpa</i>	Alpine situations except on Vancouver and Queen Charlotte Islands
Western white pine	<i>Pinus monticola</i>	Coast and Interior Wet belts
Western yellow pine	<i>Pinus ponderosa</i>	Interior Dry belt
Western hemlock	<i>Tsuga heterophylla</i>	Coast and Interior Wet belts
Western larch	<i>Larix occidentalis</i>	Interior Dry belt
Broad-leaf maple	<i>Acer macrophyllum</i>	Coast belt
Vine maple	<i>Acer circinalum</i>	Coast belt
Garry oak	<i>Quercus Garryana</i>	Southern Vancouver Island
Aspen	<i>Populus tremuloides</i>	General
Black cottonwood	<i>Populus triocarpa</i>	General on low alluvial soils
Red alder	<i>Alnus oregona</i>	Coast belt
Madrona	<i>Arbutus menziesii</i>	Southern Coast belt

## GREAT PLAINS REGION

White spruce	<i>Picea canadensis</i>	General
Black spruce	<i>Picea mariana</i>	General
Jack pine	<i>Pinus Banksiana</i>	General
Tamarack	<i>Larix laricina</i>	General
Balsam fir	<i>Abies balsamifera</i>	Northern Forest belt
Eastern cedar	<i>Thuja occidentalis</i>	Southeastern Manitoba
Paper birch	<i>Betula alba, var. papyrifera</i>	General
Manitoba maple	<i>Acer negundo</i>	Eastern Prairie belt
White elm	<i>Ulmus americana</i>	Eastern Prairie belt
Aspen	<i>Populus tremuloides</i>	General
Balsam poplar	<i>Populus balsamifera</i>	General
Bur oak	<i>Quercus macrocarpa</i>	Southern Manitoba
Basswood	<i>Tilia americana</i>	Southern Manitoba

## EASTERN REGION

White spruce	<i>Picea canadensis</i>	General
Black spruce	<i>Picea mariana</i>	General
Red spruce	<i>Picea rubra</i>	Acadian belt
White pine	<i>Pinus strobus</i>	Lake of the Woods, and St. Lawrence drainage areas, and Acadian belt
Red pine	<i>Pinus resinosa</i>	Lake of the Woods, and St. Lawrence drainage areas, and Acadian belt
Jack pine	<i>Pinus Banksiana</i>	General
Eastern hemlock	<i>Tsuga canadensis</i>	Southern Ontario and Quebec and the Maritime Provinces
Eastern cedar	<i>Thuja occidentalis</i>	Northern Forest belt and south
Balsam fir	<i>Abies balsamifera</i>	Northern Forest belt and south
Tamarack	<i>Larix laricina</i>	Northern Forest belt and south
Yellow birch	<i>Betula lutea</i>	Mixed Hardwood-Softwood belt and south
Paper birch	<i>Betula alba, var. papyrifera</i>	General
Sugar maple	<i>Acer saccharum</i>	Mixed Hardwood-Softwood belt and south
Red maple	<i>Acer rubrum</i>	Mixed Hardwood-Softwood belt and south
Silver maple	<i>Acer saccharinum</i>	Tolerant Hardwood belt and south
Basswood	<i>Tilia americana</i>	Mixed Hardwood-Softwood belt and south, west to Manitoba
White elm	<i>Ulmus americana</i>	Mixed Hardwood-Softwood belt and west to Manitoba
Red elm	<i>Ulmus fulva</i>	Mixed Hardwood-Softwood belt and south
Aspen	<i>Populus tremuloides</i>	General
Balsam poplar	<i>Populus balsamifera</i>	General
White ash	<i>Fraxinus americana</i>	Tolerant Hardwood belt
Black ash	<i>Fraxinus nigra</i>	Northern Forest belt and south
Beech	<i>Fagus grandifolia</i>	Mixed Hardwood-Softwood belt and south
White oak	<i>Quercus alba</i>	Tolerant Hardwood belt and south
Red oak	<i>Quercus rubra</i>	Mixed Hardwood-Softwood belt and south
Bitternut hickory	<i>Carya cordiformis</i>	Tolerant Hardwood belt
Butternut	<i>Juglans cinerea</i>	Tolerant Hardwood belt
Walnut	<i>Juglans nigra</i>	Carolinian belt
Tulip tree	<i>Liriodendron Tulipifera</i>	Carolinian belt
Cucumber tree	<i>Magnolia acuminata</i>	Carolinian belt
Sycamore	<i>Platanus occidentalis</i>	Carolinian belt
Chestnut	<i>Castanea dentata</i>	Carolinian belt





FIGURE 11.—White spruce along Slave River, a great reserve of newsprint stock. (Courtesy of Dominion Forest Service.)



FIGURE 12.—Mixed type; white pine, spruce, and yellow birch, at Madawaska, Ontario, a fairly valuable combination. (Courtesy of Dominion Forest Service.)

#### METHODS OF LOGGING

The climatic and physiographic conditions and the character of the timber, determine to a large extent the methods

employed in the exploitation of the timber. In the Eastern and Great Plains regions, where the winters are long and cold, and there is plenty of snow, practi-

cally all of the logging is carried on during the winter. The cutting commences early in the autumn, usually in September, and as much as possible of the felling and bucking is completed before the snow gets too deep. From then until spring, the logs are hauled out on sleighs to the rivers and lakes and the spring freshets carry them to the mills. Horses are generally used for hauling but tractors are becoming more plentiful.

River driving is a cheap method of

engineering problem. Few of the rivers on the coast are drivable for this large timber. Logging operations are carried on throughout the year. After the trees are felled and bucked, the logs are "skidded" or "yarded" to the main road by means of cables operated by donkey engines. Until recently the skidders dragged the logs along the ground but now the high-lead system is generally followed. This consists of passing the hauling cable through a



FIGURE 13.—One of the great rafts, or "booms" of logs floated from the forest to the sawmill on Vancouver Island, B. C. (Courtesy of Dept. of Trade and Commerce.)

transportation for softwoods where drivable streams are plentiful, but hardwoods cannot be driven with the same facility. In hardwood operations and in some places where the hauling distance to streams is too great, logging railways are used, but as yet there are not many in the east.

In the Coast belt and some parts of the interior in British Columbia, the timber is so large that mechanical power is used entirely and logging is essentially an

pulley attached to the top of a spar tree 100 to 200 feet from the ground. In this way the front end of the log is lifted and obstacles are more easily avoided. In some operations the "sky-line" system is used, in which a cable is elevated at both ends as a track and the logs are brought in suspended from a travelling block, somewhat after the principle of the ordinary hay fork in a barn. This method is very useful in crossing valleys or on very rough ground.



FIGURE 14.—Loading western yellow pine logs for rail shipment to sawmills, at Merritt, B. C. (Courtesy of Dominion Forest Service.)

Various methods of "roading" are employed. If the distance is short, the logs are usually placed in a trough-like skidroad made of logs placed end to end and a long string or "turn" of logs, fastened together by chains, is hauled out by cables which are sometimes nearly a mile long. In some camps motor trucks which straddle the skid-road are used to haul the logs. Where the gradient is sufficient the logs are sent down chutes and in some places they are floated out in flumes. Of late years, however, as the logging operations have extended back from the shores, railways have become the standard means of transportation in most of the larger operations.

The long fiords and numerous islands along the coast provide a shoreline of about 7,000 miles, along which logging camps are scattered from the International boundary to Alaska, and the protection afforded by the islands makes it possible to tow logs for hundreds of miles in safety. The mills are therefore nearly all located where they have access to rail as well as water transportation. For towing in protected waters, the logs are made up into narrow flat

booms held in shape by "swifters" laid across the booms and fastened to the outside boom sticks, but where rough water is liable to be encountered, solid booms or rafts several logs deep and bound together by cable are constructed. It has been found lately that under some conditions—especially long tows in rough water—it is cheaper to load the logs on barges.

One distinctive feature of the lumber industry on the coast due to the geography of the country, which enables the logs to be towed from one place to another, is the division of the logging and milling branches as distinct industries. The greater part of the logging is done by independent firms who sell their logs to the mills. Elsewhere in Canada the pulp or lumber mills own the standing timber and do their own logging.

In parts of the interior of British Columbia where the timber is smaller, the rivers drivable, and there is snow for hauling, eastern methods are followed.

#### FOREST INDUSTRIES

The two main classes of primary forest industries are the lumber industry, which



FIGURE 15.—Skidding square white pine in Ontario. (Courtesy of McNamara Lumber Co.)

includes the manufacture of lumber, lath and shingles, and the pulp and paper industry.

The average annual cut of standing timber during the years 1922 and 1923, is estimated at 2,524 million cubic feet. Of this about 822 million was cut by the lumber industry, 362 million by the pulp industry and 1,340 million was used or sold in an unmanufactured state in the form of fuelwood, logs, square timber and pulpwood exported, posts, rails, poles, mining timber, ties, etc., valued at \$80,000,000. The secondary industries

which include the sash and door, cooperage, furniture and box factories, etc., add about \$75,000,000 to the value of the primary products.

#### THE LUMBER INDUSTRY

There are between 2,500 and 3,000 saw mills in operation in Canada. Quebec has the largest number, but British Columbia now occupies the premier position both in quantity and value of production. The lumber industry is on the decline in eastern Canada, but is increasing in British Columbia.

#### AVERAGE ANNUAL PRODUCTION OF THE LUMBER INDUSTRY, 1919-1923

	LUMBER		LATH		SHINGLES		Total Value \$
	Quantity 1,000 B. F.	Value \$	Quantity 1,000 Pcs.	Value \$	Quantity 1,000 Pcs.	Value \$	
Eastern Provinces:							
Prince Edward Island . . . . .	5,457	158,718	793	3,888	6,547	21,254	183,851
Nova Scotia . . . . .	161,672	4,676,152	35,811	180,782	14,750	52,509	4,909,533
New Brunswick . . . . .	412,655	12,652,993	263,841	1,486,328	246,374	963,329	15,102,650
Quebec . . . . .	744,524	24,462,305	180,658	922,544	400,393	1,388,121	26,772,970
Ontario . . . . .	866,725	31,752,983	253,272	1,432,168	50,441	227,661	33,412,813
Total . . . . .	2,191,033	73,703,151	734,375	4,025,801	718,505	2,652,865	80,381,817
Prairie Provinces:							
Manitoba . . . . .	55,762	1,535,141	15,923	92,510	63	371	1,627,922
Saskatchewan . . . . .	25,800	844,915	6,930	40,074	361	1,821	886,810
Alberta . . . . .	30,349	869,273	2,758	14,204	1,402	6,505	889,982
Total . . . . .	111,911	3,249,229	25,611	146,788	1,826	8,697	3,404,714
British Columbia . . . . .	1,268,037	36,146,808	93,382	549,377	2,076,309	9,130,853	45,827,038
Total Canada . . . . .	3,570,981	113,099,188	854,368	4,721,966	2,796,640	11,792,415	129,613,569



## THE PULP AND PAPER INDUSTRY

The pulp and paper industry is at present confined to British Columbia, Ontario, Quebec, New Brunswick and Nova Scotia, though a mill is being built in Manitoba. The greatest development has been in Quebec, which now leads the provinces in both pulp and paper production. Ontario comes second and British Columbia third.

New mills under construction and extensions planned will in the next two years materially increase the output.

In 1924 there were 115 mills manufacturing pulp or paper, 46 of these made pulp only, 34 were combined pulp and paper plants and 35 made paper only. These plants represent a capital investment of approximately \$460,000,000 and distribute \$50,000,000 annually in salaries and wages to 27,627 employees, in



FIGURE 16.—Pulp and Paper Mill at Three Rivers, Quebec, one of the superb newsprint installations that puts Canada in the forefront of the woodpulp producing regions of the world. (Courtesy of International Paper Co.)

In the following summary of production, in order to prevent duplication, only the pulp exported as such is given, the balance being used in the manufacture of the paper.

The industry is growing so rapidly that average figures over even five years do not indicate the present status. The figures for 1924 are therefore added.

addition to the men employed in the woods.

## TRADE IN FOREST PRODUCTS

Situated in a northern latitude which precludes the production of many commodities of daily use and with a small population engaged chiefly in the primary production of natural products,

## AVERAGE ANNUAL PULP AND PAPER PRODUCTION, 1919-1923

	PULP MADE FOR EXPORT		PAPER PRODUCED		Total Value
	Quantity Tons	Value \$	Quantity Tons	Value \$	
Nova Scotia .....	23,007	813,141	.....	.....	813,141
New Brunswick .....	73,992	6,248,722	.....	.....	6,248,722
Quebec .....	447,617	25,856,571	535,600	50,375,290	76,231,861
Ontario .....	144,552	10,341,927	587,135	51,253,040	61,594,967
British Columbia .....	56,117	4,591,027	133,315	10,486,470	15,077,497
Total .....	745,382	47,851,388	1,256,050	112,114,800	159,966,188
Total, 1924 .....	700,472	31,403,655	1,718,714	133,319,497	164,723,152

Canada of necessity imports heavily from other countries. Any resource or industry which furnishes a surplus for export is therefore of great importance in the equalization of trade and financial exchange. The principal exports are agricultural products, but the products of the forest rank second. During the five years 1920 to 1924 the average annual value of the exports of forest products was \$241,987,023 and of imports only \$30,222,162, leaving a favorable balance of \$211,746,861.

With only a line separating Canada from the United States for three thousand miles, with connecting transportation systems and similar market standards and requirements, it is but natural that the trade between the two countries should be greater than with more distant countries overseas. At present 83 per cent of Canada's trade in wood and wood products is with the United States and the relative value of these products is increasing steadily. In 1920 they comprised 32.12 per cent of Canada's exports to the United States; in 1921, 39.8 per cent, in 1922, 50.61 per cent and in 1923, 51.85 per cent.

Exports to Great Britain amount to about \$22,670,000 annually, and to other countries \$21,060,000. Of these

countries, Australia, Japan, New Zealand, South Africa, France and China are the principal purchasers in order of importance.

Pulp and paper comprise over one-half of these exports and lumber, shingles and other saw mill products are about one-third. The value of the average annual exports of forest products increased nearly 500 per cent from 1908-12 to 1923-25. Part of this increase is due to enhanced prices, but the quantity, especially of pulp and paper, has also increased greatly. Nearly two-thirds of the newsprint used in the United States is made from Canadian wood, imported either in the form of pulpwood, pulp or paper, and while the production in the United States has been practically standing still, the increased consumption has been met by importations, chiefly from Canada.

The development of the Panama Canal route has resulted in an extensive lumber trade for British Columbia in the Eastern States as well as in Europe. Lumber production is decreasing in the Eastern provinces, but is increasing in British Columbia and already western woods are competing in Ontario and Quebec and the Maritimes, with local lumber.

#### VALUE OF AVERAGE ANNUAL CANADIAN EXPORTS AND IMPORTS OF FOREST PRODUCTS, 1920-1924

	UNITED STATES		GREAT BRITAIN		OTHER COUNTRIES		TOTAL	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	\$	\$	\$	\$	\$	\$	\$	\$
Logs, lumber, unmanufactured and partly manufactured wood.....	83,490,263	11,945,217	13,599,928	28,772	8,546,702	113,219	105,636,893	12,087,208
Manufactured wood.....	820,402	5,682,201	1,128,237	358,008	814,237	518,277	2,762,879	6,558,486
Wood pulp.....	38,733,853	1,713,633	5,203,565	2,310	3,629,776	23,453	47,567,194	1,739,396
Paper, except printed matter	75,209,840	8,396,217	2,739,494	850,432	8,070,726	590,423	86,020,060	9,837,07
Total.....	198,254,358	27,737,268	22,671,224	1,239,522	21,061,441	1,245,372	241,987,023	30,222,162
Per cent.....	81.9	91.8	9.4	4.1	8.7	4.1		
Balance of trade.....	170,517,090		21,431,702		19,816,069		211,764,861	

#### AVERAGE ANNUAL VALUE OF EXPORTS OF FOREST PRODUCTS, FISCAL YEARS ENDING MARCH 31ST

Classes of Products	1908-1912	1913-1917	1918-1922	1923-1925
	\$	\$	\$	\$
Raw Materials:				
Pulpwood, logs, etc.....	7,709,389	8,495,642	16,409,741	21,713,966
Poles, posts, piling, ties, etc.....	746,565	562,064	1,885,273	3,516,685
Sawmill and shinglemill products.....	34,934,453	38,078,900	64,911,985	87,952,079
Manufactured:				
Cooperage, furniture, doors, etc.....	958,867	910,333	2,141,884	2,134,223
Wood pulp.....	4,871,843	10,384,226	41,837,612	43,571,995
Paper, except printed matter.....	3,597,674	16,214,236	62,095,261	92,155,938
Total.....	52,818,791	72,645,401	189,281,756	251,044,886

## ADMINISTRATION OF THE FORESTS

The Federal Government administers the forests in the Provinces of Manitoba, Saskatchewan and Alberta, the Territories and in the Railway Belt and Peace River Block in British Columbia. The two latter tracts were given to the Dominion by the Province of British Columbia as its share in the cost of building the Canadian Pacific Railway. In the rest of the Dominion the forests are administered by the respective Provincial governments.

It has been the general policy of Canada to dispose of timber by means of licenses to cut rather than by the sale of the land and as a result 92 per cent of the forest land in Canada is still owned by the Crown in the right of the Dominion or Provincial Governments. About 12 per cent of the forest land is under license, but on 80 per cent of the forest area the timber is unalienated. It is estimated that 86 per cent of the saw material is on Crown land, 26 per cent unalienated and 60 per cent under license. Of the pulpwood resources 92 per cent is on Crown land, 61 per cent unalienated and 31 per cent licensed. The people of Canada therefore still own outright approximately 50 per cent of the remaining timber and have a substantial interest and a measure of control over an additional 40 per cent. The various governments receive in direct revenue from the forests over \$12,000,000 annually, and in some of the provinces the forest is one of the principal sources of revenue.

Since the Governments have reserved the right to increase the annual fees for the licenses and the royalties payable on the timber cut, they are able to share in the enhanced value of stumpage and by properly regulating the cutting, this heritage of the people of Canada should be a permanently increasing source of revenue.

The Dominion Government and the provinces of British Columbia, Ontario, Quebec and New Brunswick maintain technical forestry staffs for the administration and protection of the forests un-

der their jurisdiction. The Dominion Forest Service in addition to providing protection to the forests on all Dominion lands, administers the Forest Reserves which cover 34,440 square miles, provides annually about five million seedlings and cuttings to farmers on the prairies for the planting of shelter belts, collects and publishes data regarding forest resources, utilization and trade in forest products and maintains a research service with a permanent forest experiment station at Petawawa, Ontario, and numerous subsidiary stations throughout the Dominion. Forest Products Laboratories are maintained at Montreal and Vancouver. The National Parks which include 10,554 square miles are administered by the Canadian National Parks Branch and the forests outside of the reserves and parks by the Timber and Grazing Branch, all of the Department of the Interior.

The Province of British Columbia has established permanent Forest Reserves covering 6,541 miles and Parks including 1,649 square miles. Ontario has 18,366 square miles in Forest Reserves and 4,449 square miles in Parks. In Quebec approximately 168,000 square miles have been temporarily proclaimed Forest Reserves but a policy of permanent reservations is being established. The Parks include 5,771 square miles.

*Fire Protection*

The protection of the forests from fire is the most important function of all the forest services in the Dominion and much progress has been made in the way of equipment and organization. With the immense area to protect, the scant population in or near the forests and the extreme hazard of coniferous forests and long spells of dry weather in the spring and summer, the task of protecting the forests is tremendous.

Nine-tenths of the fires are due to human agency and public education is therefore an important part of the work. In equipment the most important items are lookout towers and stations, telephones, portable fire pumps and aircraft.

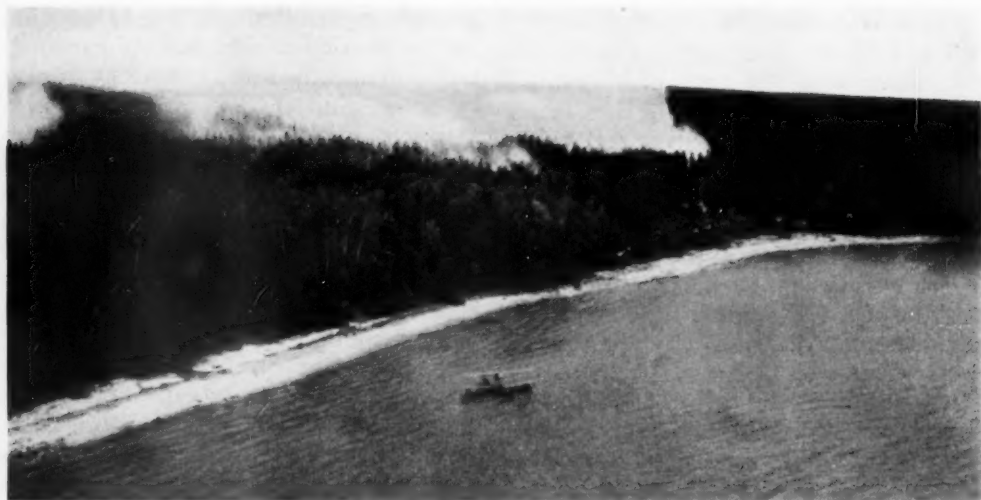


FIGURE 17.—Seaplanes landing forest rangers to quell fire in Manitoba region. (Courtesy of Dominion Forest Service.)

The latter are used extensively in the Dominion and Ontario services and to some extent in British Columbia and Quebec. Radio is now being adapted for communication and may in time replace to a large extent the telephone services.

#### *Forestry Education*

Courses leading to degrees in forestry are given at the University of British Columbia, Vancouver, B. C., University of Toronto in Ontario, Laval University, Quebec, and University of New Brunswick, Fredericton.

The professional and other societies interested in forestry include the Canadian Society of Forest Engineers, the Canadian Forestry Association, the Association of Forest Engineers of the Province of Quebec, the New Brunswick Forest Club, the Canadian Lumbermen's Association, the Timber Industries Council of British Columbia and its subsidiary associations, and the Canadian Pulp and Paper Association.

#### FOREST DEPLETION

I have estimated that the original forest area of 1,300,000 square miles carried at least 925 billion cubic feet of timber. Today less than 250 billion

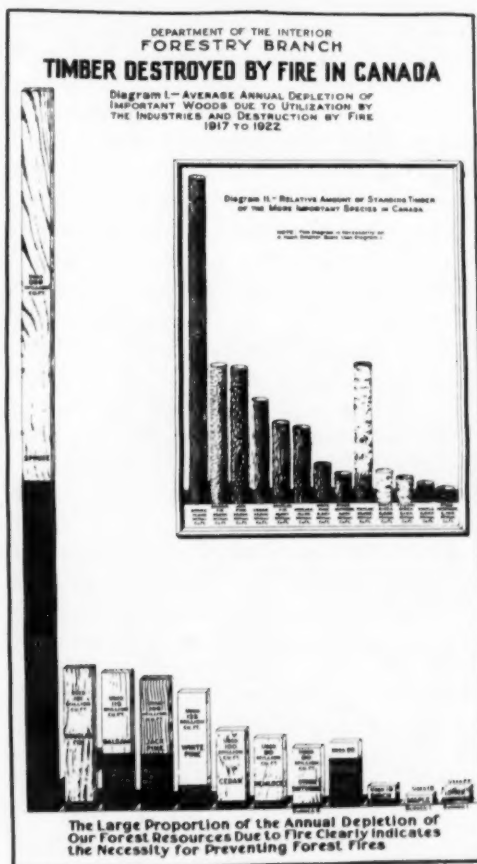


FIGURE 18.—Chart to show depletion of timber resources through ravages of fire. (Courtesy of Dominion Forest Service.)



feet or about 27 per cent is left. The records of production indicate that only 120 billion cubic feet, or 13 per cent, has been cut for use, leaving a loss of 555 billion, or 60 per cent, due partially to the clearing of the land, but chiefly to fire. There have been serious losses through insects, especially the spruce budworm which destroyed in ten years 115 million cords of spruce and balsam in Quebec and New Brunswick, but these losses are sporadic and do not permanently impair the productivity of the forest to the same extent as fire. The losses from fungus diseases are also large but, like insect damage, it is eventually replaced by nature.

At the present time the annual cut amounts to about 2,524 million cubic feet of standing timber, fire destroys 800 million and the loss due to insects, fungi, wind, etc., is estimated to bring the total annual depletion to about five billion cubic feet.

growth of the export trade to other countries, the demands on the forests of Canada are bound to increase rather than decrease in the future.

#### REFORESTATION

Very little authoritative data is available as to the rate at which the forests are growing, but as most of the merchantable stands are virgin in which decay offsets growth, and on the average 1,300,000 acres of young growth of various ages are destroyed by fire every year, it is doubtful that the increment equals the depletion.

There are, however, large areas which nature has reforested, not generally with the more valuable species of the original stand, but which in time will produce crops of usable timber. There is no reason why with the soil and climatic conditions Canada possesses, the present production could not be maintained or augmented, provided the loss from fire

AVERAGE ANNUAL CUT OF STANDING TIMBER BY THE LUMBER AND THE PULP AND PAPER INDUSTRIES BY FIVE-YEAR PERIODS IN 1,000 CUBIC FEET

	LUMBER INDUSTRIES			PULP AND PAPER INDUSTRY			Total Cut
	Lumber	Shingles	Total	Pulpwood Used in Canada	Pulpwood Exported	Total	
1908-1912 .....	916,368	37,888	954,256	75,856	106,467	182,323	1,136,579
1913-1917 .....	843,055	54,282	897,337	178,039	118,004	296,043	1,193,380
1918-1922 .....	788,973	61,279	850,252	292,735	135,044	427,779	1,278,031

Though the quantity of timber used for lumber is decreasing in Canada the pulp and paper industry is expanding at such a rapid rate that the total amount required for these principal wood-using industries is increasing at the rate of over 14 million cubic feet per annum. The use of fuelwood, ties, poles, posts, mining props, etc., is increasing with the development of the country and the growth in population. With the depletion of the forests in the United States and the

were materially reduced and logging operations were conducted so as to utilize to the best advantage the present stand and leave the forest in a condition safe and favorable to reproduction. The Canadian public is beginning to realize the value of the assets represented in the forests, and there is no doubt that steady progress in conservation will be made and that the forests of Canada will continue to provide their share in the prosperous development of the country.

## TRANSHUMANCE IN THE SHEEP INDUSTRY OF THE SALT LAKE REGION

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**T**RANSHUMANCE has been typically developed by the Mormons in the Salt Lake Region. The seasonal migration of livestock, particularly sheep under the care of shepherds, between the basin lowlands and the mountain slopes and plateaus, characterizes the industry of this region. It resembles the great annual south-north and return movement of cattle across the Great Plains during the middle of the nineteenth century, but it is more localized.

Transhumance differs in its periodicity and regularity, and its fixity of sedentary base, from mere nomadism, the continuous casual vagrancy of whole pastoral peoples with no fixed residence; the seasonal migration of entire groups with their flocks and herds, like that of the Khirgiz of the Asiatic steppes or the Russo-Scandinavian Lapps with their reindeer,<sup>1</sup> constitutes a phase of pastoral life intermediate between transhumance and nomadism.

Civilization undoubtedly owes much of its advancement, if not its very origin, to domestic animals. When primitive man subdued and trained to his service the sheep, the horse and the ox, he made his first definite progress toward social and economic organization and order, advancing from the dependence upon wild game, with all the dangers and uncertainties of such a source of subsistence, to a relative security against hunger and exposure. Growing out of this came fixed settlements, social solidarity, and leisure for improvement.

How this domestication of the sheep, horse and ox took place, whether by

<sup>1</sup>For the distinction between nomadism and transhumance, see Bernard, Augustin and Lacroix, N., "L'évolution du nomadisme en Algérie," *Annals de Géographie*, Vol. 15, 1906, pp. 152-165.

purposeful effort on the part of some primitive genius or through accidental association or as the result of a combination of the two processes, we do not know and it were idle, from a scientific viewpoint, to speculate; but the domestic animals from immemorial antiquity have fed and clothed and sheltered so large a proportion of the human race and still furnish the basis of so large and varied an industry that every phase of animal husbandry possesses an interest not only scientific but popular and romantic as well.

### CAUSES OF TRANSHUMANCE

The seasonal migration of flocks arises from distinctive geographic conditions.<sup>2</sup> In Western United States and in the Mediterranean lands migration is practiced in search of winter forage when the mountains have become inhospitable. In central Chile, the low grazing lands become parched during the rainless summer, and force the graziers and their flocks to the rainier mountain ranges. In Argentina, just across the lofty Andes, as the plains become drenched with rain, the herders drive their bleating droves to the mountains to enable them to escape the

<sup>2</sup>In Spain, where transhumance has been carried on for generations, many early writers failed to appreciate the real significance of the physical environment on the seasonal migration of sheep. Some believed that the constant warfare between the Christians and the Moors necessitated a form of movable property, which could be driven from danger during hostilities; some intimated that the devastation of plagues, such as the Black Death, caused transhumance to spread over the depopulated areas, and still others considered the long marches a necessary conditioning process that kept the animals strong and sturdy. For excellent treatments of transhumance in Spain, see Fribourg, André, "La transhumance en Espagne," *Annals de Géographie*, Vol. 19, 1910, pp. 231-244; and Klein, Julius, "The Mesta, A Study in Spanish Economic History, 1273-1836" (Cambridge, Mass.), 1920.

humid summer heat and the insect pests that prevail at this time, and also to permit the ranges to recuperate. In each instance transhumance is consequent upon contrasts in altitude, and their consequent marked differences in climate, reflected by natural vegetation.

*The Salt Lake Region a Striking Example of Transhumance in America*

The Salt Lake region, one of the more important sheep-growing districts of the West, affords probably the most striking example of transhumance in America. Therefore, a local study of this phase of pastoral life presents a picture of the practice as carried on in most of the Rocky Mountain and Intermontane regions.

PHYSICAL ENVIRONMENT OF THE REGION

Probably not more than 10 per cent of Utah's more than 52½ million acres ever can be used for the cultivation of crops because of aridity on the one hand and rugged relief on the other. Thus the state is destined to obtain its agricultural income from more than nine-tenths of its land by the grazing of animals. The entire area, except occasional bare spots, such as alkali flats, can be utilized as pasture for livestock, especially sheep and goats.

INFLUENCE OF RELIEF AND CLIMATE

The great differences in precipitation in the Salt Lake region are due almost wholly to topography, the receipt varying from 4 to 28 inches at stations between 2,800 and 10,000 feet. The increase in precipitation begins at a considerable distance to windward of the Wasatch Mountains and progresses at a fairly constant rate on the gradual ascent (Fig. 1). The rainfall in these mountains at elevations ranging from 7,500 to 8,700 feet is about ten times the amount received on the desert 75 miles to the west. The lowland area is dry, primarily because of its interior location, but also because it lies in the rain shadow of the Sierra Nevada Mountains. Owing to the closed character of its drain-

age, air as well as water can enter it only by descent. Thus all winds tend to pick up rather than deposit moisture. The mountains receive precipitation because the winds are adiabatically cooled as they ascend the precipitous slopes and deposit moisture there.

NATURAL VEGETATION

Mountain Forest Pastures (summer range).—The lofty Wasatch Mountains, easternmost of the basin ranges, receive from 20 to 40 inches of rainfall annually, and are, therefore, cloaked with a mantle of trees, especially conifers, of which the Douglas fir, White fir, Alpine fir, Lodgepole pine, Engelmann spruce, and the Blue spruce are most important. These forests are of open growth and contain many grassy parks which furnish excellent summer forage (Fig. 2). These mountain pastures abound in a profusion of grasses, weeds, and browse, of which the most conspicuous are the wheat grasses, tall mountain bromes, sedges, fescues, service berries, sages, yellow brushes, choke cherries, scrub oaks, roses, snowberries, asters, Indian paint brushes, blue bells, and wild peas. They adorn every nook and crevice (save those which were denuded during the "free-for-all" grazing period) where there is a bit of soil, redeeming the waste places with their beauty—a riot of reds and blues and yellows; as if the goddess Flores had pursued the retreating snow-banks with an innumerable host of magicians who decorated the bare spaces with lavish liberality. The approximate elevations and carrying capacities of these pastures are shown in Table 1.

TABLE 1.—CARRYING CAPACITIES OF PRINCIPAL FORAGE TYPES OF UTAH NATIONAL FORESTS <sup>3,4</sup>

Type	Elevation	Acres per Sheep
Sagebrush.....	4,650- 6,500	4.5
Browse.....	6,500- 7,800	3.
Aspen.....	7,500- 8,500	3.
Coniferous timber...	9,000-11,000	6.
Alpine.....	11,000-	3.

<sup>3</sup> Data furnished by Ernest Winkler, United States Forest Service.

<sup>4</sup> Owing to the diverse moisture and temperature conditions, the carrying capacity varies widely in different parts of the range region.

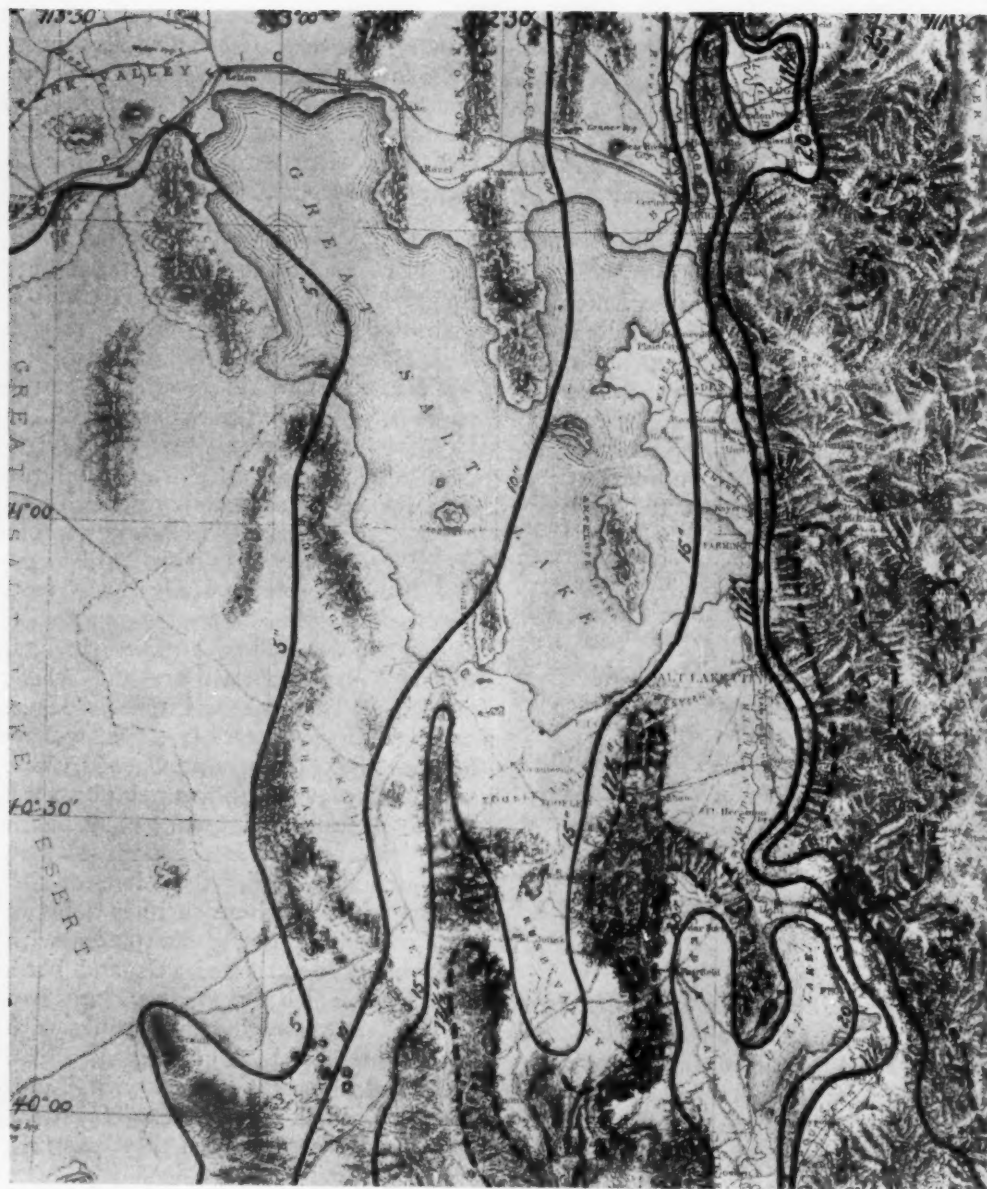


FIGURE 1.—Annual rainfall map of the Salt Lake region. Note the increase in precipitation with the increase in elevation.

Prior to their inclusion within the reserves, these lands were a part of the public domain, and their forage conditions were deplorably bad. Vagrant stockmen roved about the region pasturing their flocks wherever they could find forage. Their "four-footed locusts" frequently denuded a whole range in a

single passage.<sup>5</sup> To protect themselves

<sup>5</sup> Nature has given to the sheep a mouth designed for close cropping, an insatiable appetite for grass, browse, and saplings, and small sharp hoofs, which cut the turf. These combined with early and close grazing enable the sheep to transform quickly the beautiful lush pastures of the mountains into a desolate "no-man's-land," which can be prevented only by careful supervision of herders and rangers.





FIGURE 2.—Sheep grazing the tender sweet grasses in one of the numerous "parks" nestled among the conifers of a National Forest. These sheep are being "loose herded," which means that they are in the open, are quiet, and are uniformly distributed over the range. (Courtesy of U. S. Forest Service.)

against these tramps, the resident stockmen grazed their animals more heavily each season than before. With the arrival of spring each grazer would drive his animals at once to the earliest green pasturage, then to the next, and the next, striving always to keep ahead of competing stockmen. This practice of early grazing became particularly destructive when the animals closely followed the retreating snow-line, cropping the earliest vegetative growth almost as soon as it appeared. The stock of succeeding herdsmen cropped the successive growths as soon as they developed, and the plants had no time to gain strength or to produce seed between successive croppings. In many localities the range was so crowded that it was grazed continuously throughout the season; the only period of rest was during the time required for the herbage to grow enough after being closely cropped to again permit grazing. Consequently many ranges were practically ruined. The plants became weakened, no seed developed, and reproduction ceased. Either inferior forage plants, brush or weeds replaced them, or no growth at all succeeded. This condition was intensified near streams and water holes, and on per-



FIGURE 3.—Denuded range around Mud Lake, Wasatch National Forest, Utah. Sheep brought from the surrounding range to the shore of the lake for water and bedding, transformed this once grassy pasture into a veritable dust-bed. (Courtesy of U. S. Forest Service.)

manent bedding and salt grounds (Fig. 3). The situation on many Utah ranges

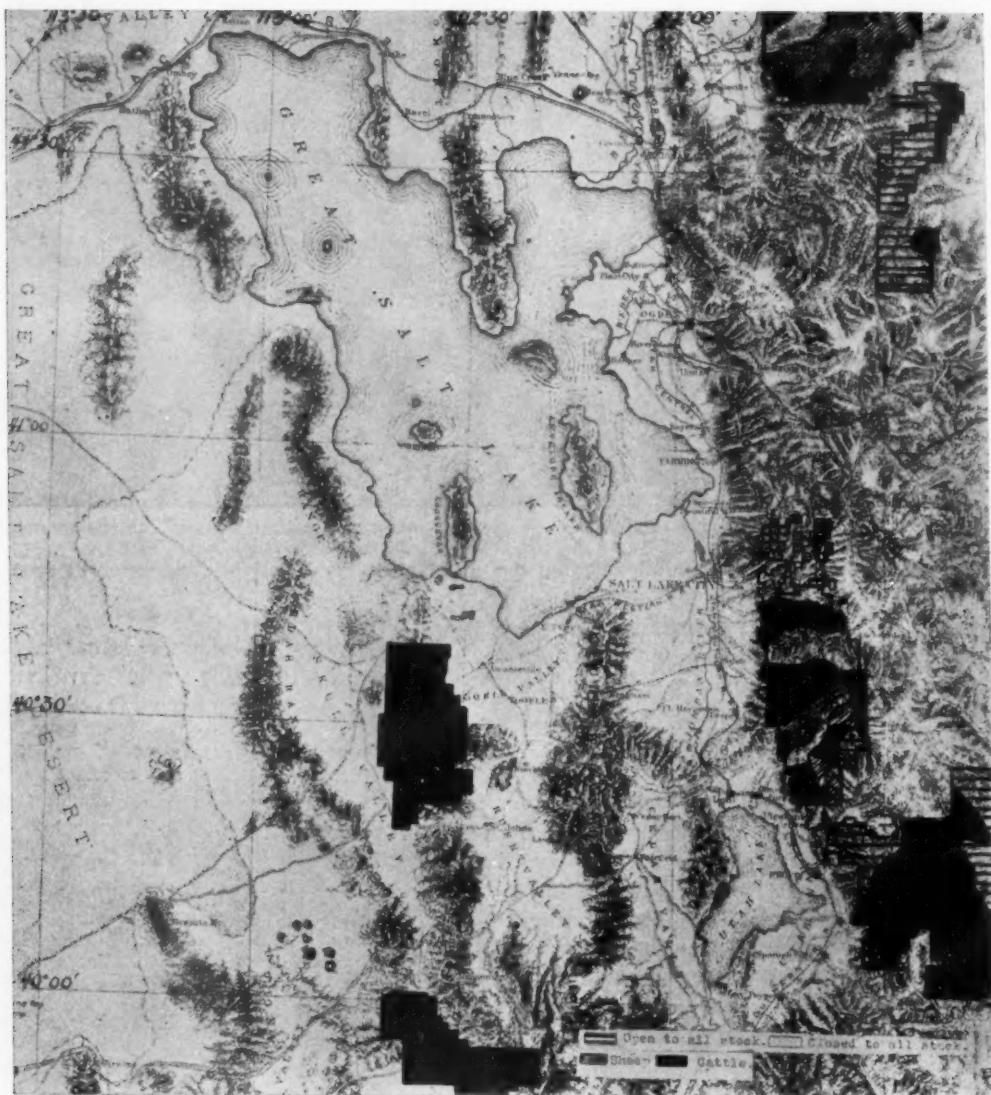


FIGURE 4.—National Forests in the Salt Lake region. Certain areas within the reserves are closed to all stock to prevent the pollution of the domestic water supply of the towns and villages at the foot of the Wasatch and to furnish places for recreation. Other areas are open to all stock because the vegetation furnishes good forage for all, and the maximum use of most mountain pastures is obtained by mixed grazing. Some sections are open only to sheep and goats because they contain plants that are poisonous to cattle. Others are open only to cattle and horses because these animals utilize all the plants. Wherever possible, exclusive allotments are given to sheep and to cattle, provided the best use of the range can be obtained.

as early as 1880, only 33 years after the initial settlement in Salt Lake Valley, is well indicated in the following statement from the Census of 1880:

"The once best grassed and most valuable pasture grounds of the territory

present now scarcely a trace of their former abundant forage grasses or browse feed, and nothing but a constant change of locality makes them serviceable even to sheep. . . .

"In 1880 there was not a single locality west of the Wasatch Mountains from

Cache Valley to the basin of the Rio Virgin which did not exhibit effects of overgrazing."<sup>6</sup>

After their inclusion within the National Forests definite grazing seasons were established, depletion of the range ceased, and the carrying capacity increased slightly. The lands were so administered that the officials had "nearly complete charge of the kind and number of animals permitted to graze on a given forest, the time at which they

Forests in summer go to the desert in winter.

**Desert Pasture (winter range).**—In the Salt Lake region, nearly all the desert country contains plants of some forage value. Many of them, to be sure, are harsh, thorny, and nearly leafless, but they are relished by sheep (Fig. 5). Major Powell said of this desert forage:

"Most of the desert grasses seem to protect themselves from the great aridity by growing in bunches. They appear



FIGURE 5.—Sheep on winter range. The winter ranges are restricted to the valleys and deserts where precipitation is light and water or snow is available for the animals. The vegetation consists of shrubs and weedy annuals, which are readily grazed by sheep but are not relished by cattle. (Courtesy of U. S. Forest Service.)

are turned in, the time removed, their distribution, whether grazed alone or with other kinds of animals, and to whom should be given the privilege of grazing animals in the forests"<sup>7</sup> (Fig. 4).

These now well regulated mountain grasslands seem capable of carrying more stock during the summer than the public domain can maintain during the winter, a circumstance that has gone far to encourage winter feeding on Oasis farms. Consequently only about 50 per cent of the sheep grazed in the National

to produce proportionately a greater amount of seeds than the grasses of the Humid Region, and their nutritive qualities, especially in winter, seem to be due thereto. In general, the grasses seem to have large, strong stems, and are not so easily broken as those of the Humid Region, and the rains and snows by which they would be so broken down are infrequent. Again, for these reasons, the grasses, standing long after they are cut by frosts, cure themselves, forming thereby winter pasturage."<sup>8</sup>

Of the numerous desert plants, winter fat, bud-sage, and galleta grass yield the

<sup>6</sup> "Tenth Census of the United States," Vol. III, Agriculture (Washington, 1880), p. 119.

<sup>7</sup> Stewart, George, "This Public Domain of Ours," Utah Agricultural College Experiment Station, Circular 49, 1924, p. 37.

<sup>8</sup> Powell, John, "Report on the Lands of the Arid Region of the United States" (Washington, 1897), p. 110.

best forage, though greasewood and shadscale contribute no inconsiderable part. Winter fat, a low shrub, is eaten close to the ground. It constitutes about 10 per cent of the desert pasture and therefore supplies considerable forage. Bud-sage occupies limited areas in the shadscale region, and its tender young shoots are of great value during the spring lambing and migrating period. Galleta grass occurs over wide areas, can stand heavy grazing, and is relished by sheep. Shadscale and greasewood comprise more than 60 per cent of this desert vegetation and are readily grazed by sheep.

These arid pastures furnish sustenance to thousands of animals from November to May. On such lands 7 to 23 acres are required to support one sheep for the grazing season of 2 to 5 months (Table 2). As the snow melts on the desert the water supply disappears, and the animals follow the retreating snow-line up into the mountains.

TABLE 2.—LENGTH OF GRAZING SEASON AND CARRYING CAPACITIES OF DESERT FORAGE TYPES

Forage Types	Length of Grazing Season (Months)	Acres per Sheep
Winter-fat.....	2-5	7-13
Bud-sage.....	2-5	7-13
Shadscale.....	2-5	7-23
Galleta grass.....	2-5	7-23
Greasewood.....	2-5	13-23

*Relation of Irrigated Valleys to the Mountain and Desert Pastures*

The irrigated valleys bear an intimate relation to the pastures in the adjoining mountains and deserts, for it is estimated that 90 per cent of the sheep in the region are owned by Oasis farmers. In fact, the agriculture is based in no small measure on the production of winter feed for the range stock. Alfalfa, the chief crop based on acreage, must be marketed locally because of its low value per unit of bulk and because of the quarantine against it by neighboring states due to the ravages of the alfalfa weevil. Also by-products of the sugar industry,

such as sugar beet tops, pulp, and molasses, as well as grain by-products can be marketed only through livestock.

Thus the productive Oasis has become a magnet to which thousands of animals are attracted for winter feeding. Besides those who practice transhumance, scores of farmers, who run no range animals in the National Forests, because they cannot obtain grazing permits,<sup>9</sup> purchase range lambs in the fall from the transhumants who are traversing the Oasis with their flocks enroute to their winter pastures on the desert. They fatten these lambs for market, thus disposing of certain bulky farm crops and by-products that would otherwise be wasted. The fattened animals have high value per unit of weight, and can easily stand transportation costs to distant markets.

THE BEGINNING OF THE SHEEP INDUSTRY IN UTAH

Sheep husbandry is one of the oldest and one of the most important activities in the Salt Lake region. Brigham Young encouraged it during the pioneer period as a means of supplying homespun, with the result that during the 50's and early 60's nearly every farmer possessed a few sheep. This was imperative in as much as the Mormon oasis was approximately 1,000 miles from the nearest important settlements on the east and west, and the settlers had to become self-sufficing.

As early as 1848 a few flocks of coarse-wooled Illinois sheep were brought to Utah by Mormon immigrants and more accompanied each succeeding train of covered wagons. The numbers increased

<sup>9</sup> In granting grazing permits, the Forest Service gives preference to citizens of the United States who own and reside on improved ranch property which is dependent upon the National Forests, and who own stock within certain exemption limits. It gives second choice to prior users who do not own improved ranch property, and persons owning such property who own stock in excess of the established exemption limit. These are largely men whose income is derived almost wholly from livestock.

The permits are granted for periods of one to five years for a definite number of animals, which are, so far as possible, assigned to definite areas.



rapidly during the Gold Rush, for the Mormons purchased from the weary argonauts at ridiculously low prices their worn and footsore sheep including occasional Cotswold rams. Thus the Census

reporting sheep in the five counties (Box Elder, Davis, Salt Lake, Utah, and Weber), parts of which constitute the Salt Lake Oasis,<sup>10</sup> and in one of these, Davis County, the average rose to 500. The average per permittee on the National Forests, however, was about 735.

#### TRANSHUMANCE

Transhumance began in the Salt Lake region at an early date as a means of utilizing vast areas of land, otherwise valueless, and later as a means of extending the farm operations of the small land owners in the irrigated valleys.<sup>11</sup> As progress in transportation was made and the crude homespun became unnecessary, the small home flocks were consolidated into coöperative herds. Each town placed its several herds together thus making one large flock for centralized management. Some of these flocks are still extant, e.g., the Marti and Fairview Coöperative herds.<sup>12</sup> The establishment of the National Forests with the resultant regulation in the number of animals to be grazed on a certain area tended to break up the large herds. Now the droves are smaller and are owned by many men, which leads to more home feeding and hence to improved stock.

Utah sheep are essentially range animals.<sup>13</sup> They are herded seasonally to and from the mountains and by this



FIGURE 6.—Herder and camp-tender tenting late in August at an elevation exceeding 10,000 feet in District 8, Uinta National Forest, Utah. The herder at the left in the photograph, has run sheep in this region for more than 20 years.

of 1850 shows a sheep population of 3,262 in the Salt Lake region, and the numbers increased rapidly in the succeeding years.

#### *The Present Situation in the Salt Lake Region*

There are approximately half a million sheep in the Salt Lake region, most of which are range animals. In 1919 there was an average of 294 sheep per farm

<sup>10</sup> For an account of the geographic unity of the Salt Lake Oasis, see *ECONOMIC GEOGRAPHY*, July 1925, Vol. I, No. 2, pp. 206-235.

<sup>11</sup> Scores of irrigated farms in the Oasis average only 5, 10, 15, and 20 acres. Naturally the labor income from these dwarf holdings is insufficient to meet the needs of the large Mormon families. Thus in order to extend their agricultural operations and ameliorate their condition, many of them are renting or purchasing additional land, raising wheat on the bench-lands under dry-farming conditions, or running cattle and sheep on the mountain and desert ranges.

<sup>12</sup> Marti and Fairview in San Pete County, lie just outside the Salt Lake region.

<sup>13</sup> A recent farm-management survey in Salt Lake Valley in which 428 farms were studied, reports a very small number of sheep. This is probably consequent upon the small size of the farms, the high cost of land and water, the absence of dog-proof fences, and the large proportion of town-dwelling farmers.



FIGURE 7.—Herder and camp-tender on the Sevier National Forest, Utah. The herders frequently make homes of their wagons when the topography permits. In rugged sections, however, where wagons can not be hauled, tents supplant the wagons. (Courtesy of U. S. Forest Service.)



FIGURE 8.—Winter lambing of range sheep. Eighty per cent of these lambs lived. (Courtesy of U. S. Forest Service.)

transhumance are kept in good forage and cool weather both in summer and in winter.

Three breeds predominate in this region—the Rambouillet, Hampshire and Shropshire. All are grown for both wool and mutton, and hence are called “dual purpose” types. The Rambouillet is the favorite breed, though feeders claim that black-faced Hampshires are better adapted to winter-feeding because of more rapid gains.

The sheep enter the National Forests in bands varying from 1,000 to 1,500 ewes with their lambs about July first, when the vegetation is well along in its short period of growth. When they are dry (without lambs) they are admitted in bands of about 2,200. The operation of small flocks, preferably 1,200 ewes with their lambs, is encouraged by the Forest Service. The lambs occasionally total as many as the old sheep, though usually the ratio is from 75 to 80 per cent.

In this region two men, a herder and a camp-tender, accompany the flock. The latter cooks, distributes salt for the sheep, packs in food supplies, and moves camp; the former guards his flock constantly against such predatory animals as coyotes, wild cats, and wolves, which sometimes become troublesome, prevents loss through straying, and directs the grazing. They live either in a tent or in a wagon, depending upon the topography of the area to be grazed. When in the National Forests they move camp every 7 to 10 days, according to the water supply (Figs. 6 and 7).

The flocks graze the lower foothills in June pending their admittance into the National Forests July first. Once in the reserves they begin working slowly toward the alpine meadows, which they reach in September. At this time the best forage is at the higher, cooler, moister elevations.

The animals are given new pasture each day to prevent the range from being overgrazed. For the same reason they are not bedded in one place more than two nights, and they do not have permanent salt grounds.

When the sheep are at an elevation of 10,000 to 11,000 feet, they frequently get no water for two or three weeks, but the snow, the heavy dew, and the green grass supply the necessary moisture. At lower elevations, they must drink every third day. On an average the sheep of central Utah get water once a week.

In many Utah forests the sheep scatter as they graze. This is known as “loose herding” and is especially desirable in a steep and rugged country, such as this. The forest rangers encourage “loose herding” for the sheep are in the open,



FIGURE 9.—Dipping sheep prior to their entry into a National Forest. (Although the sheep tick does not possess the instinct of migration to any great extent, nevertheless if one is introduced into a flock, it spreads rapidly until every animal is infested. This is because range sheep are frequently close herded, crowded into corrals, and come into close contact with one another on the bed grounds. To eradicate the ticks, the sheep are dipped, so that the fleece becomes thoroughly saturated in a medicated liquid which kills the parasites.) (Courtesy of U. S. Forest Service.)

they are quiet, and they are uniformly distributed over the range.

Lambing is done both at selected points in the National Forests and on farms in the valleys (Fig. 8). When conducted on the open range efforts are made to select camp sites that are well protected against storms and where there is plenty of food and water. Many herders prefer to have their sheep lamb on farms in the Oasis, where they have sheds and corrals and can give them good care, thus saving a higher percentage of

Sheep generally occupy higher pasture lands than do cattle and horses, because (1) they can browse on rougher and rockier land, (2) can endure thirst for a longer period, and (3) being dipped prior to entrance into the National Forests, are bothered to a less degree by blood-sucking insects, which infest the moist, higher elevations (Fig. 9).

About September 30 the breeding stock (ewes and ewe lambs) are driven toward the irrigated valleys or desert ranges for winter, while the lambs not



FIGURE 10.—Summer range in the Wasatch National Forest. The lower slopes are used for spring grazing, while the higher ones, now covered with snow, are used late in the summer. (Courtesy of U. S. Forest Service.)

lambs and old ewes. If a ewe, shortly after parturition gets wet, she at times runs away from her lambs. On a farm a herder can pen her up until she claims them. The lambing season lasts about one month and before it is over shearing begins. Utah sheep yield on an average from 6 to 8 pounds of wool at each shearing. About 50 head can be sheared by one man in a day. The lambs are generally weaned about the time the sheep depart from the National Forests. Many of the lambs are sufficiently fat at weaning to go immediately to the slaughter houses.<sup>14</sup>

<sup>14</sup> Lambs after five months on the ranges of the National Forests in the Salt Lake region usually

retained for breeding purposes are sold to Oasis farmers or are shipped to market. The sheep which accompany the transhumants are grazed in the foothills until about December first at which time there is adequate snow on the desert to furnish them with water. In getting out of the National Forests they travel by special roads, after which they follow public highways, except the streets that pass through the centers of cities and towns and the main piedmont arteries of travel, which carry heavy automobile traffic. Once on the desert they travel at will

weigh from 56 to 80 pounds. Those grazed in the Uinta National Forest customarily top the Chicago market.



where certain main routes are reserved for them and the land cannot be appropriated under the grazing homestead laws. The sheep require from one to three weeks to trail from the mountains to the desert and even more to return because they frequently wander as far as 250 miles.

As the desert snows melt in the spring, the water supply disappears and the animals move again towards the mountains. May and June find them grazing the foothills once more (Fig. 10), and late September finds them grazing the sweet, succulent alpine grasses and flowers in the shadows of the highest peaks of the Wasatch almost 12,000 feet above tide and 7,600 feet above their winter and spring pastures on the desert flats. Thus the animals occupy in alternation two

complementary zones, each of which can support them for a part of the year only.

#### SUMMARY

No domesticated animal has proved so adaptable to the varying conditions of natural environment as the sheep, which can thrive on the lush green pastures of the high mountains or on the harsh and almost leafless gray shrubs of the desert. Thus the keeping of sheep and especially transhumance, is an important activity in the Salt Lake region, for it permits the utilization of great tracts of land, such as mountains and deserts, which otherwise would be unutilized. It also harmonizes well with the intermediate Oasis, where the transhumants find support of their industry.

## OKLAHOMA—AN EXAMPLE OF ARRESTED DEVELOPMENT

*Charles N. Gould*

State Geologist, Oklahoma

**F**ROM the standpoint of the student of economic geography, Oklahoma is a case of arrested development. During the period when the various states adjoining Oklahoma on the north, east, and south were passing through their pioneer stages, Oklahoma lay dormant. Arkansas was admitted to the Union in 1836, Texas in 1845, and Kansas in 1861. Oklahoma did not become a state until 1907. For half a century it was the Indians' land, and white men were not welcome.

embraced in the State of Oklahoma. During the first half of the nineteenth century, these people had been driven from their ancestral homes east of the Mississippi by the encroachment of white settlers, and had been assigned to new lands west of Arkansas. The ancient treaties recited, "As long as fire shall burn, as long as water shall run, as long as grass shall grow, this land beyond the Father of Waters shall be to you and to your children." Having once suffered from the depredations of the white man,



FIGURE 1.—The golden grain fields of Oklahoma constitute one of America's greatest granaries.

### EARLY HISTORY

The so-called Five Civilized Tribes (or Nations): Cherokee, Creek, Seminole, Choctaw, and Chickasaw, owned, or claimed, practically all of the land now

and well aware of his greediness for land, these people were naturally suspicious and strove to insure the preservation of the new abode to themselves and to their posterity.



FIGURE 2.—The last of the Wichita Indian primitive grass houses has vanished. Civilization has swept them away.

These were an agricultural people. Not the "Wild Indians of the Plains," nomadic, blood-thirsty and savage; nor yet Cooper's Indians, demigods in paint and feathers; but for the most part they were quiet, home-loving farmers, and small stock growers. Land was not held individually, but belonged to all members of the tribe. Nor was land considered valuable. A young man would take unto himself a wife from among the maidens of his people; build a log cabin

hard by a mountain spring, plant a little field of corn, and a truck patch, earmark a few half-wild razor-back hogs, brand a few cattle, and live on the products of the farm, the pasture and the forest. There were no large towns, and only a few small villages. There were no railroads, or other lines of communication except stage lines. Consequently there was little interchange of ideas. Each nation had its own separate government, and managed its own affairs without re-



FIGURE 3.—The improvement in schools measures Oklahoma's advance. The old and the new side by side. (Courtesy of Oklahoma Dept. of Agriculture.)



FIGURE 4.—The level lands and excellent roads of Central Oklahoma, a vista of future empire. (Courtesy of Okmulgee Chamber of Commerce.)

gard to the United States Government, or to any other outside power.

The soil was fertile. Great stretches of prairie land occupied the western part of the area, and noble forests grew in the eastern section. Ten large rivers, with valleys as fertile as those of the Danube or the Ohio, crossed the territory. There was an abundance of building stone of various kinds, sandstone, limestone and granite. Coal was known to exist, but was not considered valuable. There were bold springs of salt water, and ranges of hills of massive white gypsum

which extended for a hundred miles. The magic stores of petroleum and natural gas, since discovered beneath the surface, were as yet undreamed of.

The climate was mild. The borderland of forest and prairie made the territory the natural habitat of a large and varied fauna and flora. Buffalo and antelope on the plains, and bear, deer, and wild turkey in the forest, provided game in abundance.

During the three decades following the transfer of the Five Civilized Tribes to their new home west of the Mississippi,



FIGURE 5.—The sparkling streams and noble forests of the rugged Ouachitas.



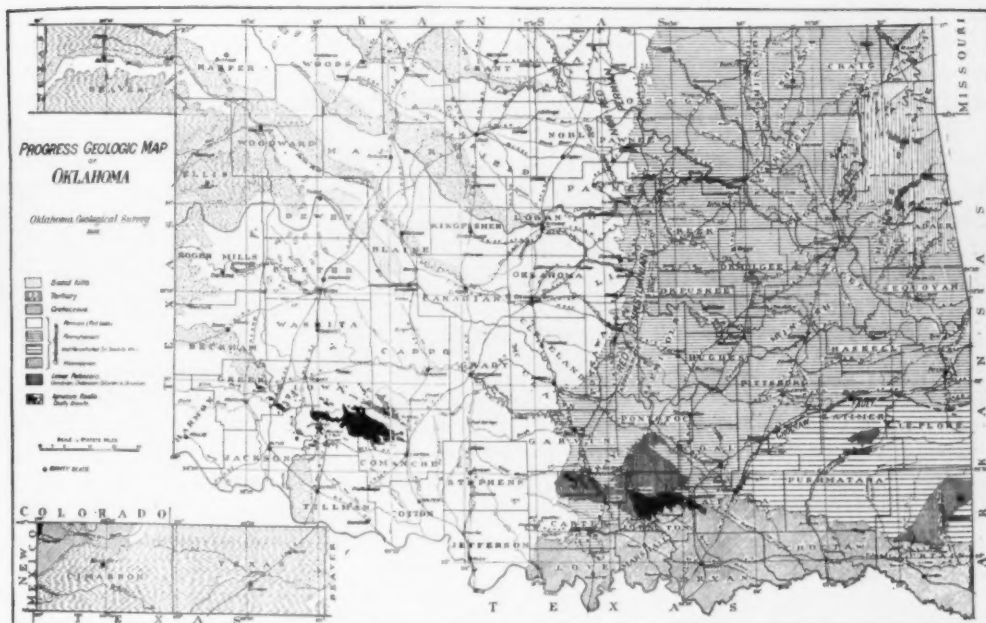


FIGURE 6.—The geologic background of Oklahoma is interesting and varied, as are the mineral resources. The geologic section is indicative of the geologic history. (Courtesy of Oklahoma Geological Survey.)

comparatively little progress was made in the development of the natural resources. The people were happy and

contented, satisfied with conditions as they existed. There was little incentive toward improvement, and ambition was

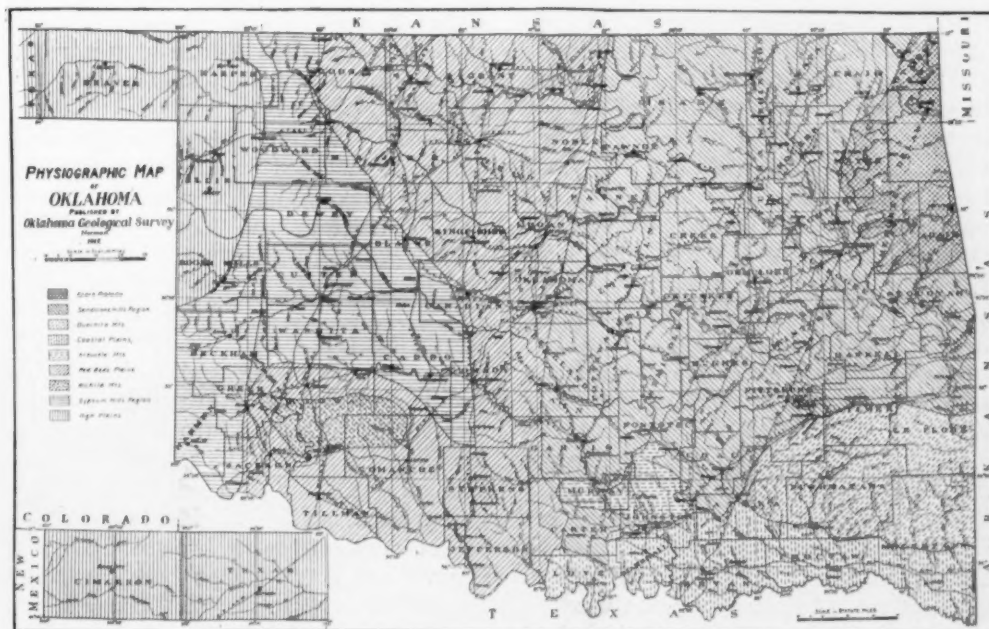


FIGURE 7.—Oklahoma is a state of varied relief, in only very few places too level for good drainage, and in but few too rugged for machine agriculture. (Courtesy of Oklahoma Geological Survey.)

all but lacking. The products of the farm and the fruits of the chase supplied most simple needs. Life was Arcadian in its simplicity.

Then came the Civil War. Many of the Indians were slave owners, having come from slave-holding states, and the more prosperous had brought their negroes with them. As might have been expected, most of these Indians joined their fortunes with those of the Confederacy. The Indian had little to gain but much to lose. It was a white man's quarrel, but a red man's sorrow.

After the close of the war the United States government, as a punishment for joining the Confederacy, compelled each of the five tribes, except the Cherokees, to cede back to the federal government a part of its domain. The Cherokees were to sell to various Indian tribes, who might want to settle within the "Cherokee Strip." To this new territory which occupied approximately the western half of the original Indian country, the name Oklahoma, Choctaw for "red people," was given. The part remaining to the Five Tribes, the eastern half, was known as Indian Territory.

For several decades following the Civil War the general government pursued the policy of settling in the new territory, thus acquired from various tribes and scattered remnants of tribes of northern and plains Indians, which the white man had dispossessed of their tribal homes in various parts of the United States. The Pawnee, Ponca, and Otoe came from Nebraska, the Tonkawa from Texas, the Osage, Kaw, Kickapoo, and Pottawatomie, from Kansas, the Sac and Fox from Wisconsin, the Iowa from Iowa, and the Apache from Arizona. The Cheyenne, Arapahoe, Kiowa, and Comanche, the so-called "Wild Indians of the Plains," nomadic tribes that from time immemorial had roamed the Great Plains, following the buffalo from the Rio Grand to the Platte, were compelled to settle in reservations along the western margin of the new territory which had been parceled out to various tribes. A

tract of land remained in the central part of the area which had not been assigned to any Indian tribe. After several premature attempts this area, then spoken of as the "Unassigned Lands," but usually since known as Old Oklahoma, was finally thrown open to settlement at high noon, April 22, 1889.

#### SETTLING OF OKLAHOMA

It was a horse-race settlement. Each man ran for what he wanted, and took and kept what he could get. Settlements sprang up as if by magic. Such towns as Guthrie, Oklahoma City, Norman, El Reno, and Kingfisher, county seats, were in the morning bare prairies, and at night-fall cities of tents and wooden shacks, with thousands of people. Every quarter section of land had its owner. Roads were opened, school houses were built, newspapers started, post offices established, and the elements of civilization were set to functioning. Seven counties were organized, and after two years a territorial government was established. From time to time during the next fifteen years treaties were made with the various Indian tribes; and the different reservations were opened to settlement by white men, and at various dates additional counties added to Oklahoma Territory.

During this time the white man had gained a foothold in Indian Territory. Several railroads had been built. Cities were springing up. Coal was being mined at several points and shipped to Oklahoma and to adjoining states. Oil and gas had been discovered; asphalt was being taken from the ground; and there was a growing and insistent demand for statehood. After much delay treaties were entered into with each of the Five Civilized Tribes, and the land was surveyed and divided, each Indian citizen receiving his individual allotment. Tribal relations were broken up. Finally, after these things had been accomplished, a constitutional convention was held, at which time a constitution was written and later adopted by the

people, and on November 16, 1907, Oklahoma was admitted to the sisterhood of states.

With this brief background of history let us now examine Oklahoma and ascertain what manner of state it is. If possible, let us learn what has been done

vast plain, sloping southeast from an elevation of about 5,000 feet in the northwest corner, to less than 400 feet in the southeast corner. This plain is interrupted by four mountain uplifts, namely the Ozark Mountains in the northeast corner, the Ouachita (Wash-e-taw)



FIGURE 8.—The lead and zinc mines of northeastern Oklahoma have contributed great wealth to the state. (Courtesy of Chamber of Commerce, Miami.)

in 19 years by a state that for half a century marked time while adjoining states marched by.

#### THE LAND OF OKLAHOMA

Oklahoma has an area of 70,057 square miles of land, being larger than any state east of the Mississippi River. The state as a whole may be thought of as a

Mountains in the southeastern part, and the Arbuckle Mountains and Wichita Mountains in the southern part of the state. Of these four groups, the Ozark and Ouachita mountains extend beyond the border of Oklahoma into adjacent states to the east, while the Arbuckle and Wichita mountains lie entirely within Oklahoma. None of these are lofty



FIGURE 9.—The agricultural wealth of Oklahoma is revealed in the many model farmsteads that dot the fertile prairies. (Courtesy of State Dept. of Agriculture.)

mountains, as mountains go, but all have typical mountain structure, being uplifted, truncated domes, usually with cores of igneous rocks flanked with sedimentaries.

A considerable part of eastern Oklahoma consists of low, sandstone hills arranged in parallel ridges, with many ledges of limestone along the northern border of the state. Central Oklahoma consists largely of flat plains composed of red clay shales known as the red beds. Most of the higher plains of western Oklahoma are loosely consolidated formations chiefly sand and clay.

The soil is fertile. With the exception of comparatively small areas of rocky land in the mountain areas and the gypsum hills region of some western counties, there is a very small percentage of the land in Oklahoma that may not be cul-



FIGURE 10.—The forest resources of eastern Oklahoma help to make the state almost self-sufficient. (Oklahoma Geological Survey.)



FIGURE 11.—Modern barns and modern equipment throughout the establishment make Oklahoma farms genuine industrial plants with large capital investment. (Courtesy of Oklahoma Dept. of Agriculture.)

tivated. The broad valleys, and the vast stretches of level prairie upland contain deep, rich, productive soil, capable of yielding a great variety of crops.

The water supply is generally ample. In the mountain regions there are many clear, cold springs, usually of potable water. The sandstone hills region in the eastern counties also contains abundant water of good quality. In much of the red beds area of west-central Oklahoma the water is impregnated with gypsum and other mineral salts so as often to render it unsuitable for domestic use. Even in these districts, however, a supply of water is secured at low cost by means of cisterns.

Much of eastern Oklahoma was originally heavily timbered, and in the Ouachita Mountains great forests of pine, oak, and hickory are still to be found. In the sandstone hills country of the eastern counties, there is much hard wood. Cypress, holly, sweet gum and other Gulf coast trees, occur in the southeastern counties. Mistletoe, the state flower, is found growing chiefly on the elm, in the eastern and southern parts of the state.

Western Oklahoma is a prairie country. The principal prairie grass, *andropogon*, or tall blue stem, is found growing abundantly throughout central and west-central Oklahoma, but throughout the "short-grass country" of the western counties it gives place to buffalo



grass which forms a sod carpet on the prairie. The principal trees along the streams in the western part of the state are elm. Strips of sand hills north of several of the rivers in this region are covered with jack oak timber.

#### THE PEOPLE OF OKLAHOMA

This in brief, is the land which now forms the state of Oklahoma. How



FIGURE 12.—Turner's Falls in the Arbuckle Mountains. Water power is another of Oklahoma's native resources, as yet almost undeveloped. (Oklahoma Geological Survey.)

about the people? For it is a geographical axiom, known to all, that land, plus people make civilization. From whence came the people who settled this new land? What was their environment, what were their traditions, what their birthright?

The answer is: they came from everywhere, from all states and all countries, but chiefly from bordering states on the north, east, and south, and in an almost constantly decreasing number from states farther distant. From Kansas, Nebraska, Iowa, and Illinois came the corn and wheat farmer. From Arkansas and Mississippi came the cotton farmer. From Texas and Colorado came the

ranchman. The Wisconsin man has for his neighbor a family from Georgia, and the North Carolinian and the North Dakotan vote at the same precinct, although they do not always vote the same ticket.

In opening a conversation with a stranger in Oklahoma it has not been necessary to talk about the weather, as is the custom in the East. The proper thing has always been to ask, "Where are you from?" For up until the past few years all were from somewhere. The oldest native has been voting only a few years.

Out of a population of 2,028,283 in 1920, Oklahoma's citizenship was divided as follows: White, 1,821,194; Negro, 149,408; Indian, 57,337; Chinese and Japanese, 309. Of these only 53,083 are of foreign parentage.

These people, from wherever they may have come, brought with them their own traditions, manners, customs, and forms of speech. The great majority of them were of Anglo-Saxon stock, descended from either the Puritan or the Cavalier. But whether they came from Mississippi or from Michigan, from the Scioto or the Swanee, from Harrisburg or Hattiesburg, the settlers of Oklahoma are of that hardy, intrepid American race, accustomed to hardships, full of initiative, willing to work, competent to achieve. They are in Oklahoma today because they want to be here, and not because the stork happened to leave them here.

Oklahoma, then, is a meeting place of the clans. Her ideas derived from various regions, are thrown into the common melting pot, from which there is emerging a new civilization. As in the time of Caesar, "All Gaul was divided into three parts", so today Oklahoma has three chief mingling types of ideas, namely: the northern, the western, and the southern. Northern Oklahoma is full of Kansas Jayhawkers, now in their second generation. Eastern Oklahoma has Arkansawyers with squirrel rifles. Southern and western Oklahoma has eight-quart-hatted, high-booted Texas



FIGURE 13.—Like so many other things, turkeys thrive splendidly in Oklahoma and all poultry does well. (Courtesy of Oklahoma Dept. of Agriculture.)

cow punchers; but today the Jayhawkers, the Arkansawyers and the Longhorns live side by side in peace and quiet.

If one rides up to an Oklahoma farmhouse in the cool of the evening, and asks the good wife where her husband may be found, by her answer you may know from whence the family came. If she says "He is down at the barnyard," you will know the family is from the North. If she says "cowpen," they are from the

South. If she says "corral," you will know that the family came from Texas.

An Oklahoma shibboleth is the word creek. The southerner pronounces it correctly, "creek," but the northern man will almost invariably say "crick." If there are in a group ten Oklahomans, each from a different state, one may tell from whence each came by observing the word each man uses to describe a small stream of water. The man from Texas

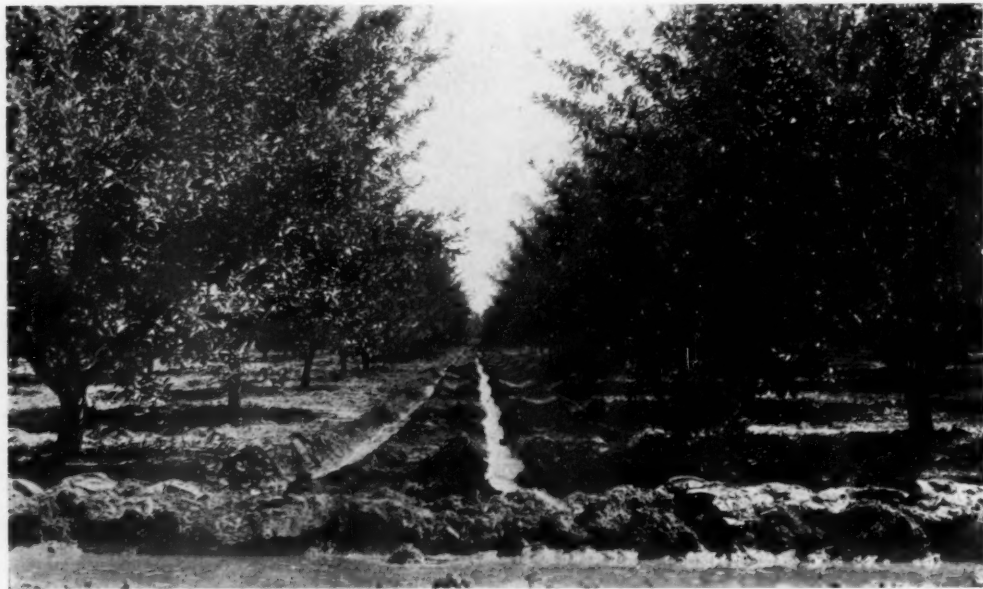


FIGURE 14.—Fruit of all kinds, except citrus, may be grown in Oklahoma. Conditions are favorable for heavy production. (Courtesy of Oklahoma Dept. of Agriculture.)

or New Mexico will say arroyo; the Kansas or Nebraskan calls it a sand draw; to the man from Ohio or Indiana it is a run; the Yankee from New York or New England says brook; the Tennessean or Kentuckian will probably call it a branch; the man from the Gulf coast of Louisiana says bayou. If the man is

#### THE RESOURCES OF OKLAHOMA

Let us turn next to the development of the resources of the state and observe what has been done. Remembering that Oklahoma got a late start let us see what has been accomplished in spite of the handicap of 50 years of inactivity.

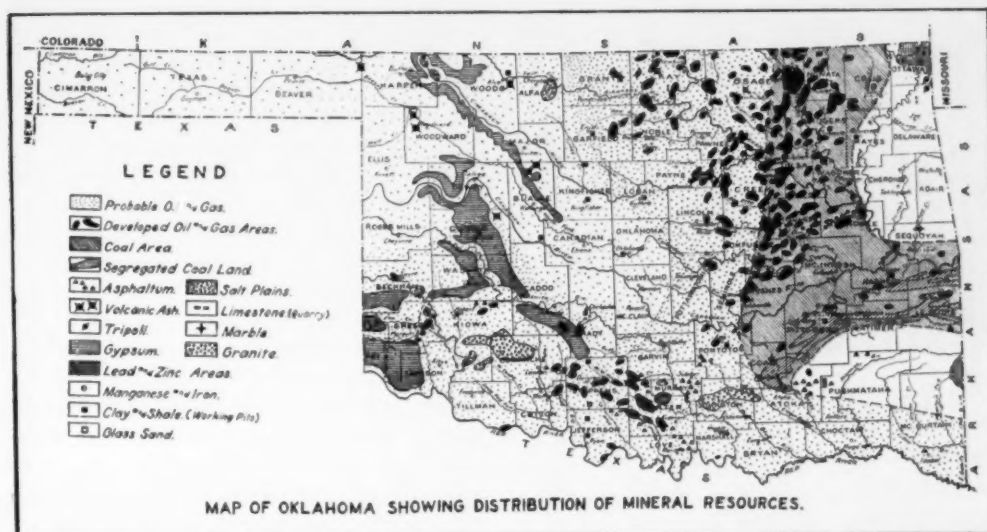


FIGURE 15.—Wellnigh the whole state of Oklahoma is blessed with mineral resources of one kind or another, supplementing the agricultural resources, and promising great industries for the future

from Arkansas or east Texas the name ravine will be used; the Colorado man says gulch; the Montana man, coulee; and the man from northern Minnesota or Wisconsin says stream. Oklahoma is yet so young that our manners of speech have not had time to crystallize.

#### MINERAL RESOURCES

First take minerals. In 1900 Oklahoma and Indian Territory combined ranked thirty-fifth among the states of the Union in the value of the mineral products, the total yearly production of minerals being valued at about \$4,000,-

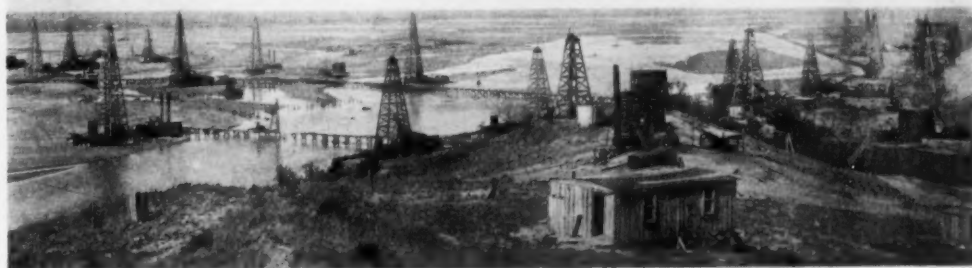


FIGURE 16.—The great oil pools of Oklahoma constitute the richest development of the Midcontinent field. They have yielded almost fabulous wealth. (Courtesy of Grandfield Chamber of Commerce.)



FIGURE 17.—A gas well may "blow off" millions of cubic feet of gas before it can be "shut in." (Courtesy of Oklahoma Geological Survey.)

000. In 1924 the value of Oklahoma mineral products was approximately \$400,000,000. In the value of mineral products Oklahoma ranks either second, or third, among the states of the Union, being exceeded only by Pennsylvania, and dividing second honors with West Virginia.

#### *Petroleum*

The great increase in value of mineral wealth has been brought about largely by the discovery and production of

petroleum and natural gas. Forty-two of the seventy-seven counties in the state now contain oil or gas fields. Some of the largest productive fields of high-grade refinable oil in the world are found in Oklahoma. As an example may be cited the fact that during several months of 1915, 60 per cent of the high-grade oil of the world came from the Cushing field of Oklahoma. The Bartlesville sand horizon of northern Oklahoma and southern Kansas as a whole has produced more high-grade gasoline oil than any other single geological horizon in the world. Such fields as Glenn, Bristow, Burbank, Healdton, Hewitt, Garber, Cromwell, and Tonkawa, to mention only a few, among the 288 oil and gas fields of the state, have produced and are still producing vast stores of oil. The total amount of oil taken from the 60,000 wells which have produced oil in Oklahoma approximates 2,000,000,000 barrels, valued at more than \$3,000,000,000. In 1925 the production of oil in this state was about 460,000 barrels per day and the end of the upward climb is not yet in sight. No one knows, nor can know for many years, how much longer this flood of black gold will be poured forth.

#### *Natural Gas*

Associated with the oil there are vast stores of natural gas. During the year 1924 Oklahoma produced over 200,000,000 thousand cubic feet of gas, valued at



FIGURE 18.—The local battery of small tanks on an oil lease, each tank holding 250 bbls. for temporary storage.



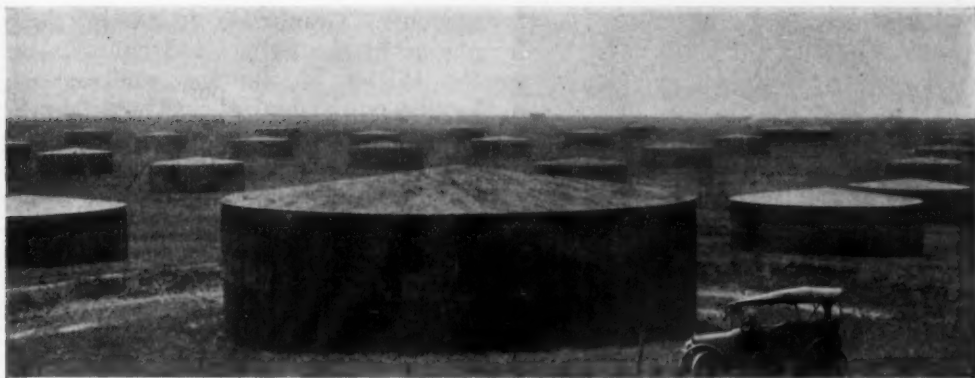


FIGURE 19.—One of the great tank farms that dot the fields of Oklahoma, each holding tens of thousands of barrels. They represent millions of potential horsepower.

\$40,000,000. Most industrial plants in Oklahoma use natural gas for fuel, and most homes in the cities throughout the state are heated with natural gas. With the oil and gas industry has also grown up the natural gas gasoline, or casing head gasoline industry, so that something like 300,000,000 gallons of casing head gas valued at \$23,000,000 are produced in Oklahoma each year.

#### *Coal*

When the oil and gas in Oklahoma have been exhausted, there is plenty of coal to fall back on. The United States Geological Survey is authority for the statement that there are located in the hills of Oklahoma 79,000,000,000 tons of coal, which at the present rate of mining is sufficient to last for 26,000 years. There are ten beds of coal which are of workable thickness under present eco-

nomic conditions, and a still larger number of thin beds which some day may be burned in the ground and the heat utilized for the production of electricity for transmission to distant points on high-power lines.

#### *Zinc and Lead*

A single county in Oklahoma, Ottawa, produces more zinc than all the rest of the United States. The amount for 1924 was 269,000 tons of zinc concentrate, valued at \$35,000,000. Associated in ore beds with zinc is lead, of which about 70,000 tons, valued at approximately \$11,500,000, are produced yearly.

#### *Asphalt*

Southern Oklahoma contains vast deposits of asphalt. More than fifty separate outcrops of asphalt are known to exist. Sometimes this material is in the



FIGURE 20.—Much of Oklahoma's oil is refined in its own great refineries, but still more is piped to sea-board and other great centers for refining. (Courtesy of Tulsa Chamber of Commerce.)



FIGURE 21.—A small mine but a thick seam of coal in eastern Oklahoma. (Courtesy of Henryetta Chamber of Commerce.)

pure form, such as grahamite, gilsonite, or impsomite, and sometimes it consists of rock impregnated with asphalt, forming either sand asphalt, lime asphalt or shale asphalt. There is no way of estimating the number of millions of tons of asphalt in the State but it is very probable that Oklahoma contains more asphalt reserves than any other state in the Union.

#### *Building Materials*

Of structural materials Oklahoma has a very large variety and inexhaustible

amounts. Granite is found in three places, in the Arbuckle Mountains, in the Wichita Mountains, and in one locality on the flank of the Ozark Mountains. In the Arbuckle Mountains the area occupied by granite, exposed on the surface, is 100 square miles. The Wichita Mountains, 80 miles long and averaging 20 miles wide, are made up almost entirely of jagged granite peaks. All this granite is high grade and suitable for a great variety of purposes.



FIGURE 23.—A well-designed coal tippie in the Oklahoma district. Oklahoma's coal beds are extensive and easily worked. (Courtesy of Henryetta Chamber of Commerce.)

Limestone of good quality suitable for building stone, for road material, for the manufacture of Portland cement rock,



FIGURE 22.—An Okmulgee glass factory, a plant of an infant, but growing industry. (Courtesy of Okmulgee Chamber of Commerce.)

for burning into lime, for concrete rock, and for all ordinary purposes to which limestone is ordinarily put, occurs in six widely scattered areas throughout Oklahoma, chiefly in the eastern and southern parts of the state. Sandstone is found in every county in the state. Portland cement rock occurs in widely scattered areas and associated with it are fuels for development. Sand and gravel for building purposes and road materials occur in practically every county. Clay and shale for the manufacture of brick, sewer tile, and other clay products are widely distributed.

Some fifteen counties in western Oklahoma contain vast beds of gypsum. It has been estimated that there are in the state 123,000,000,000 tons of this material, enough to keep 100 mills manufacturing 100 tons a day busy for 34,000 years. In other words, Oklahoma has enough gypsum to manufacture the wall plaster and other gypsum products to supply the world. Seven regions of salt springs in western Oklahoma supply enough salt water, now going to waste, to manufacture 100 car loads of salt a day. There are also enormous salt reserves in the form of rock salt.

### Summary

Thus it will be seen that Oklahoma possesses the chief essential minerals, namely, fuels, structural materials, and the metals, except iron, upon which our modern civilization is based. These are minerals which add to the wealth of any state possessing them, and without which no state can arrive at her best development.

At the present time, however, with the exception of petroleum, gas, and zinc, these vast natural resources are largely dormant. Oil money and zinc money are easy money, spectacular, appealing to the imagination and credulity of mankind. Partly for these reasons, oil and zinc have been developed out of their due proportion in Oklahoma, and more rapidly than the other, and perhaps more substantial, mineral products. At any

rate the greater part of Oklahoma's minerals are yet undeveloped. Today Oklahoma produces no sewer tile, no salt, and very little lime. Much of the granite, gypsum plaster, Portland cement, and building tile used are imported from other states. With abundant raw materials and fuel for the manufacture of these products, there is no legitimate reason for importing many of these things. However, each year more quarries, plants, mines, and industries are being established for the development of the dormant mineral resources of the State.

### AGRICULTURAL RESOURCES

Next, take agricultural products. The development of Oklahoma's agricultural wealth has kept pace with, and in some cases exceeded, the development of mineral wealth. Several things conspire to

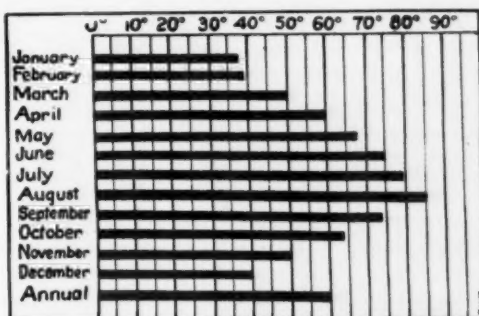


FIGURE 24.—The average temperature in degrees Fahrenheit by months indicates a very uniform annual march for an inland situation. The growing season is long and winter is never cold very long, but summer is long and hot.

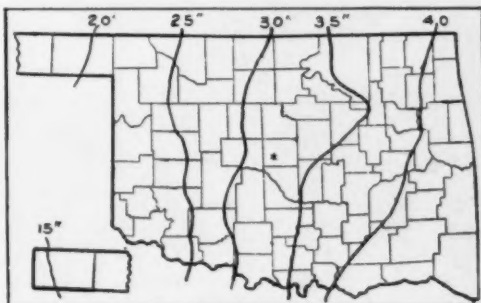


FIGURE 25.—The rainfall belts of Oklahoma are relatively uniform and regular, the annual rainfall of the easternmost belt being more than twice that of the westernmost.



FIGURE 26.—The pine forests of McCurtain, Pushmataha and other southeastern counties of Oklahoma are as large as the state of Rhode Island.

make Oklahoma well adapted to a wide diversity of agricultural products, the most important of which are soil and climate.

The soil has already been described. Suffice it here to say that with the exception of a few areas Oklahoma's soil is unusually fertile.

Climatic conditions can perhaps best be understood by studying the two charts, one showing the rainfall of the state, the other showing the average monthly temperature taken over a ten year period.

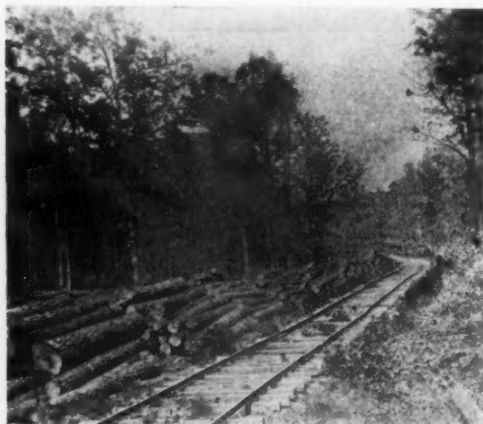


FIGURE 27.—Logs awaiting transport to the sawmills in southeastern Oklahoma.

Possibly the matter might best be understood by comparing Oklahoma

with a better-known state. Climatic conditions such as rainfall, mean and extreme temperatures, days of sunshine and length of growing seasons have such a profound influence on living conditions and on the certainty and economy of crop and livestock farming, that facts on these points are here given for Oklahoma City, Oklahoma, and for Springfield, Illinois. Each of these cities is located near the geographical center of the state, and therefore represents approximate average conditions for its respective state. Springfield, moreover, is near to and just between the center of population and the geographical center of the United States. The figures are taken from reports of the Weather Bureau, U. S. Department of Agriculture:

	Average Rainfall		Mean Temperature		Per Cent Sunshine	
	S.	O.	S.	O.	S.	O.
Jan.....	2.25	1.17	27	37	49	56
Feb.....	2.51	1.10	29	39	53	60
Mar.....	2.91	2.10	41	50	54	60
Apr.....	3.40	3.14	53	60	58	62
May.....	4.50	5.40	63	67	64	63
June.....	4.13	3.49	72	76	71	71
July.....	3.02	2.87	77	82	75	77
Aug.....	3.05	2.88	75	80	71	78
Sept.....	3.32	2.62	67	73	67	72
Oct.....	2.44	2.57	56	62	64	76
Nov.....	2.44	2.07	42	50	59	64
Dec.....	2.11	1.56	32	39	46	57
Annual...	36.08	31.03	53	59	61	66

Note in the above table that during the growing months of April to July in-



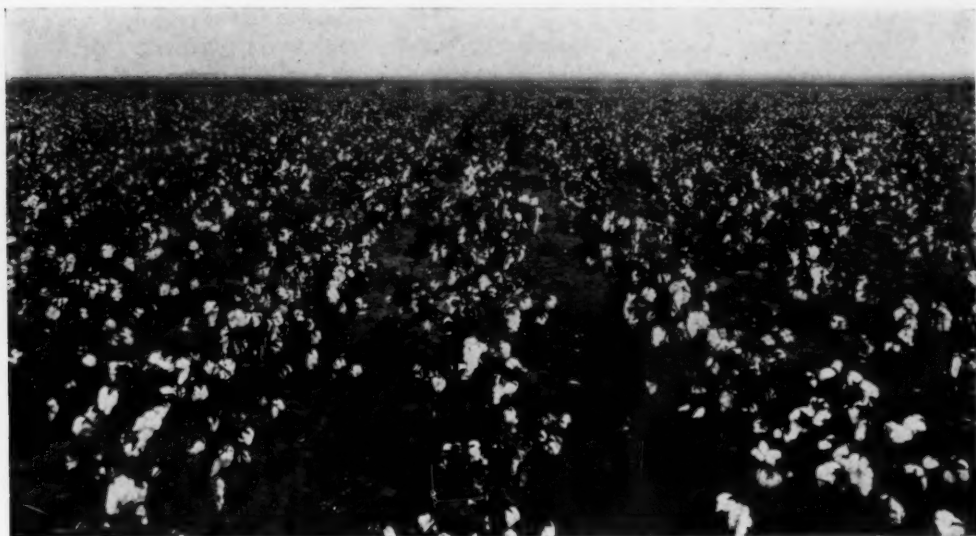


FIGURE 28.—The whole southern half of Oklahoma produces cotton. Southern planter and northern farmer both grow it. (Courtesy of Oklahoma A. and M. College.)

clusive, Oklahoma City has only .15 of an inch less rain than Springfield. That during the wheat seeding months of September and October, Oklahoma City has only .57 of an inch less than Springfield. The average annual rainfall differs by only 5.05 inches, which difference occurs chiefly in the winter months when moisture is of less worth to crops. From May to August inclusive, the mean temperature is 4 to 6 degrees higher, and the winter months of November to February

inclusive are 7 to 10 degrees warmer in Oklahoma City than in Springfield. The highest annual temperatures are 108 and 107 and the lowest are 17 below and 24 below, respectively. The range in temperature from highest to lowest is 125 at Oklahoma City and 131 at Springfield. The average annual snowfall is 8.4 and 20.6 inches, respectively.

On account of difference in altitude and a consequent variation in rainfall, there are in different parts of Oklahoma,



FIGURE 29.—For several months each summer and fall the Oklahoma cotton gins run twenty-four hours every day. (Courtesy of Oklahoma A. and M. College.)

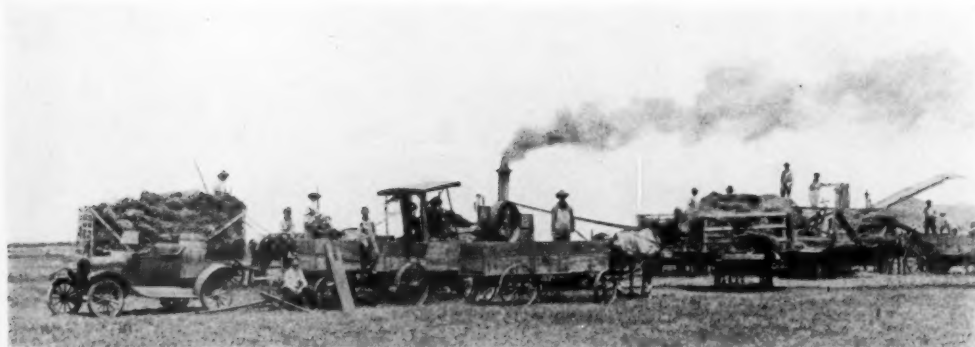


FIGURE 30.—A typical harvest scene in the rich farm sections of Oklahoma when the oats, wheat, and other small grains are ready for threshing. (Grandfield Chamber of Commerce.)

widely divergent systems of farming, each determined by local conditions. The wheat farmers from Kansas and the Dakotas prosper in north central and western sections. The corn farmers from Nebraska and Indiana are found along the fertile valley lands of the central and eastern sections. The cotton farmers of Texas and Georgia are in the southern half of the state. The lover of the plains, broad views and outdoor life will be found in the north and west. The one who prefers the more sheltered quiet of valleys and timbered hills will have selected the extreme east. The big cattle man, seeking cheap grazing lands in large areas, finds them in the high plains of the west, in the Osage

country or the mountains of the southeast. The hog, poultry or dairy farmer can select from many counties, and find conditions favorable. The fruit and truck grower will be in the more sheltered protection of the hills and timber. But in almost any county are produced successfully and profitably all of these varied crops, and occasionally a single farm grows them all. Oklahoma is thus seen to be a state of varied conditions producing a large variety of crops and livestock. Few equal it and probably none excel it in opportunities for success in any line of farming, in the low price of land, in the returns for intelligently applied labor and capital, in healthfulness, in desirable climatic con-



FIGURE 31.—Too much corn! The surplus is stored in temporary wire cribs. (Courtesy of Oklahoma Dept. of Agriculture.)

ditions and in opportunities for unmolested pursuit and acquisition for a home, contentment and a competency.

### Crops

Whereas such states as South Carolina and Mississippi have but one major crop,

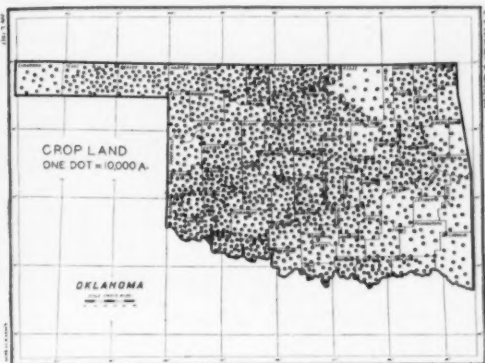


FIGURE 32.—The distribution of crop land in Oklahoma indicates that almost the whole state is suitable for agriculture.

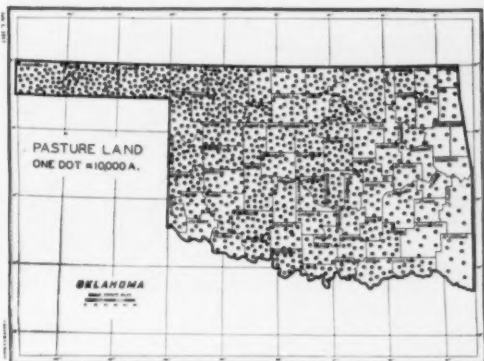


FIGURE 35.—Pasture land occupies much of Oklahoma, except the southeastern counties where forests dominate.

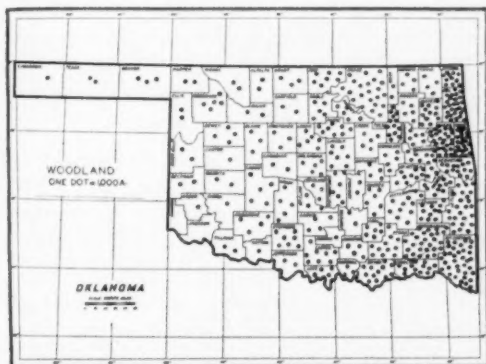


FIGURE 33.—Woodland confined to the eastern section of heavier rainfall. Commercial forests occupy only the rugged eastern counties.

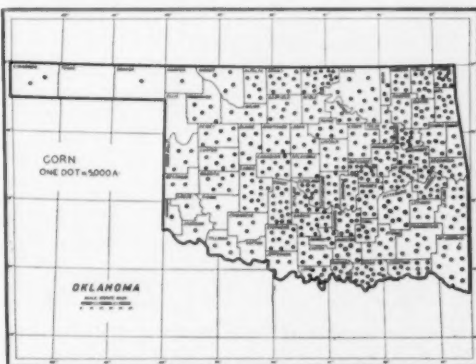


FIGURE 36.—Corn is most generally grown on the level belt between the eastern rugged forest counties and the drier western range counties.

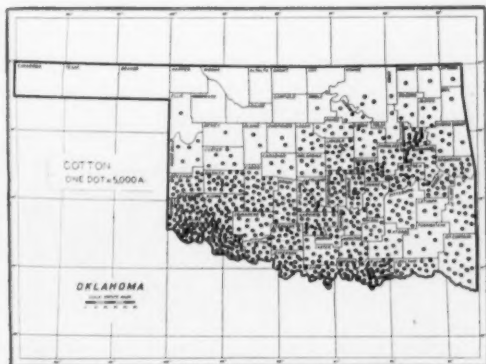


FIGURE 34.—Cotton is king in the warmer southern counties of Oklahoma where the gins work over time baling it for export.

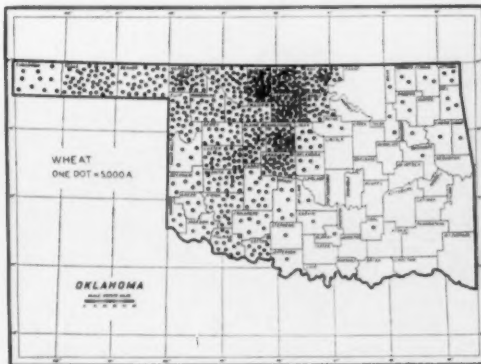


FIGURE 37.—Wheat dominates the more arid section of the state, a southward extension of the hard winter wheat region.

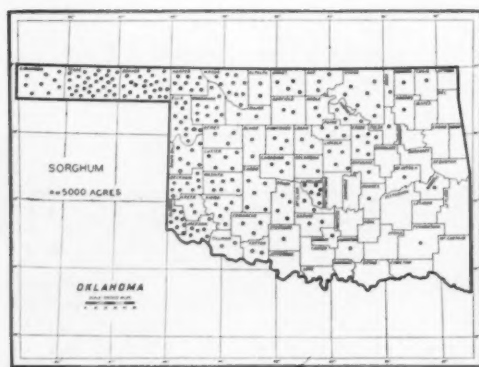


FIGURE 38.—Sorghum holds to the dry west-  
erly counties, where conditions are unfavorable  
to other crops.

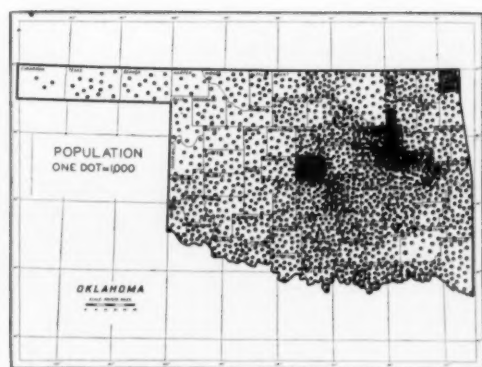


FIGURE 40.—The map of population indicates  
that mineral resources and consequent industries  
have tended to group the people in three distinct  
conurbations.

cotton; and such states as Kansas and Nebraska have two staples, namely, wheat and corn, Oklahoma, situated on the border line between the north and the south, has three staple products, cotton, wheat, and corn. All three of these crops are often raised on the same farm. In general, however, southern Oklahoma, on account of warmer climate and more generous rainfall, produces the best cotton. Northern and western Oklahoma produces the best wheat, because this is naturally a prairie country with a clay soil, and a cooler climate than other parts of the state. Due to the fact that the rainfall is more equable and the soil adapted to its growth, the best

corn is produced in eastern Oklahoma. In the western counties where the rainfall is not always sufficient for corn, the various sorghum crops, such as kafir, milo maize, feterita, sudan grass, and amber cane are extensively raised as feed crops.

The crop statistics for 1924 which may be considered a fair average crop year, show that Oklahoma ranks fifth among the states of the Union in the products of the soil with a total value of \$427,000,000. In cotton she takes second place, ranks third in winter wheat and leads in the production of broom corn.



FIGURE 39.—Stacking alfalfa in Texas county, Oklahoma. Heavy yields characterize some of the limestone sections. (Oklahoma Dept. of Agriculture.)





FIGURE 41.—The dairy industry is growing fast about the larger cities.



FIGURE 42.—Purebred shorthorns have supplanted the wild range longhorns.



FIGURE 43.—Hogs by the hundred! One of Oklahoma's resources.



FIGURE 44.—Most of Oklahoma's live stock is exported "on the hoof" to the slaughtering centers.  
(Courtesy of Oklahoma City Chamber of Commerce.)



FIGURE 45.—Panhandle milo maize, one of the most productive crops in the arid section. (Courtesy of Oklahoma Dept. of Agriculture.)

#### *Live Stock*

In former years Oklahoma was the stockman's paradise. Before the opening of the country to settlement, great herds of long-horned, dun-colored Texas cattle roamed almost at will over the broad prairies. The nutritious grasses, indigenous to the soil, the abundant

water supply and the healthful climate make Oklahoma one of the best cattle countries in the world. With settlement old conditions have changed. Instead of half-wild, long-horned cattle, there are now thousands of well-kept herds of purebred Herefords and Jerseys; instead of the tough wiry cow pony,



FIGURE 46.—Kafir corn constitutes the chief sorghum crop, the mainstay of arid agriculture. (Courtesy of Oklahoma A. and M. College.)

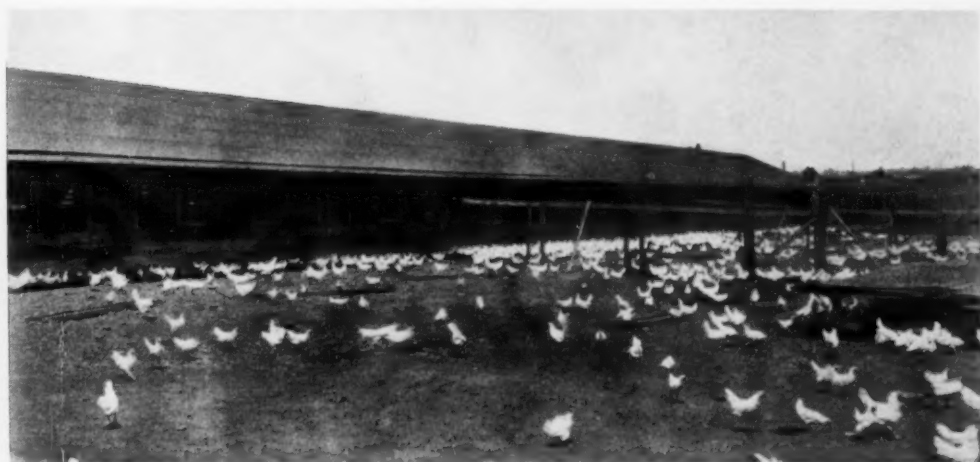


FIGURE 47.—Poultry-raising engages the activity of many Oklahomans. Conditions are favorable for the industry. (Courtesy of Oklahoma A. and M. College.)

one finds the draft horse and an occasional racer; and instead of the long-nosed, razor-back hog, there is the Poland China and the Berkshire. The value of live stock and dairy products in 1924 was \$148,000,000.

#### *Forests*

From the pine forests in the Ouachita Mountains of McCurtain, LeFlore and Pushmataha counties, in the southeastern part of the state, the lumber cut in 1924 was valued at \$4,800,000. Hardwood forests, chiefly oak, hickory and elm, occur in many of the counties in the eastern part of the state.



FIGURE 48.—Spinning room of an Oklahoma cotton mill. (Courtesy of Guthrie Chamber of Commerce.)

#### MANUFACTURING

In manufacturing Oklahoma has scarcely struck her stride. The country is yet too young. Her energies have been devoted more largely to the rapid development of the more primitive occupations, agriculture and mining. Heretofore, it has been easier to import manufactured articles from other states than to manufacture them at home, but not more profitable. To cite one example from among many: estimates show that on an average it costs \$8.00 freight on a bale of raw cotton from the Oklahoma cotton platform to the New England cotton mill, and \$17.00 freight on the manufactured product from the mill back to Oklahoma. The people of

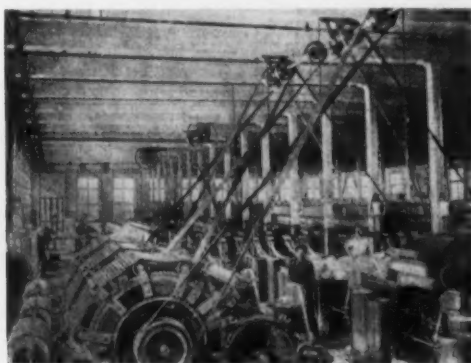


FIGURE 49.—Carding room of the same mill. (Courtesy of Guthrie Chamber of Commerce.)



FIGURE 50.—Tulsa, the oil capital of the world, boasting more millionaires per capita than any other city. Its population is about 125,000. (Courtesy of Tulsa Chamber of Commerce.)

Oklahoma are learning this fact, and are establishing their own cotton mills in order to save the \$25.00 freight per bale of cotton. So with clay products, Oklahoma has vast amounts of high-grade clay, and plenty of fuel for its manufacture. Recently plants have been established in many parts of Oklahoma, and at the present time the greater part of the brick and tile used are manufactured in the state.

The largest manufacturing industries in Oklahoma are the refining of petroleum and the extraction of gasoline from natural gas. Other manufacturing plants include flour mills, creameries, cotton oil mills, packing plants, glass plants, gypsum plants, lead and zinc smelters, and Portland cement plants. The total value of the manufactured articles in Oklahoma approximates \$400,000,000 per year.

It is doubtful if another state in the Union can show such balanced industries, namely in round numbers, \$400,000,000

new wealth per year from minerals, \$400,000,000 from products of the soil and \$400,000,000 from manufactured articles.

#### CITIES

One result of the unusual development of the state's resources has been the rapid growth of cities. Oklahoma City, located on what was a bare prairie in 1889, is now the capital and the wholesale distributing center of the state, with an estimated population of 125,000 people. Tulsa, which as late as 1900 was a shack town of a few hundred people, is now the oil capital of the world, also with an estimated population of 125,000. Such cities as Muskogee, Okmulgee, Ponca, Enid, Sapulpa, Ardmore, and Bartlesville, located near oil fields, have populations varying from 15,000 up to 40,000 each. In the farming district such cities as Shawnee, Chickasha and Guthrie, or McAlester in the coal fields, range up to 15,000 and 20,000 in popu-



FIGURE 51.—Oklahoma City, the capital and chief distributing center of the state, is Tulsa's chief rival for business supremacy. It is a city of typical western energy and progress. (Courtesy of Conrad and Waterhouse.)



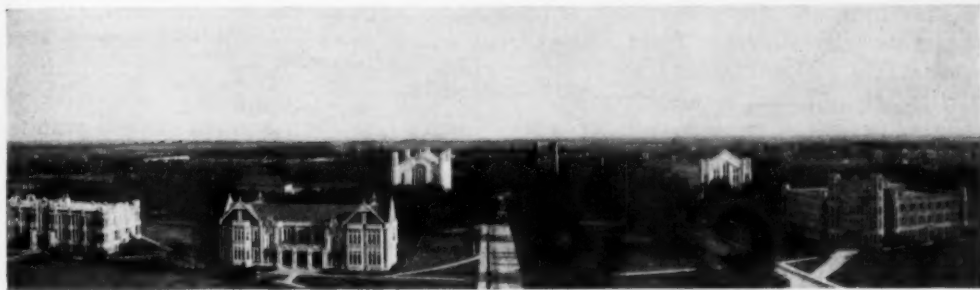


FIGURE 52.—The beautiful University of Oklahoma, with its enrollment of 4,500 students, forms the culminating feature of Oklahoma's rapid rise to culture and prosperity. It graces the charming little city of Norman. (Courtesy of Turby Studio.)

lation. There are scores and hundreds of smaller towns and villages.

#### SCHOOLS

Not only in material wealth is Oklahoma richly endowed. Her people have seen to it that education has not been neglected. The state school system ranks as one of the best in the nation. The State University at Norman enrolls 4,500 students a year, including the schools of Arts and Science, Fine Arts, Law, Medicine, Education, Engineering, Pharmacy, Journalism, Business, etc. The Oklahoma Agricultural and Mechanical College at Stillwater has an enrollment of 4,000 Oklahoma young men and women. There are in addition six teachers' colleges, five departmental agricultural schools, a women's college, a school of mines, and a military school. These schools are supported in part by large endowments of land. A number of denominational schools are located in the state. The total enrollment in various schools of higher education for the year 1925-26 approximates 35,000.

#### TRANSPORTATION

Transportation facilities are ample. Four trunk lines of railroad traverse the state, in addition to several subsidiary lines. There are more than 6,000 miles of railroad in the state. Interurban lines serve more than 20 cities. According to the law of Oklahoma every section line is a public road, and hard-surfaced

roads which are now being built in most counties form a network crossing the state in all directions. At the close of 1925 Oklahoma had 1,210 miles of hard-surfaced road with 325 miles put to grade and drain. The total cost of this construction has been \$29,675,000. The plans of the State Highway Commission contemplate for 1926 the building of 180 additional miles of hard-surfaced road.

#### LIFE IN OKLAHOMA

Life flows in the same orderly, safe, law-abiding fashion in Oklahoma as it does in other states. The customs, laws,



FIGURE 53.—Honey Creek, in the Arbuckle Mountains, a future recreation center for the state. (Oklahoma Geological Survey.)

and kindly hospitality observed here are not materially different from those in other states. The traveler finds nothing particularly different here. He will see a country beautiful and varied in topography. He may ride on well-equipped trains, put up at modern hotels, eat good food, transact business expeditiously, in attractive offices and with keen-minded men, find amusement at good theatres or golf grounds, attend good churches and hear eloquent preachers, and in general live as pleasant and strenuous a life in Oklahoma as in other

states. In a few hours' ride he may pass through level uplands like central Illinois; hills and rolling prairies like Iowa; hills covered with pine and hardwood forests like Tennessee; or rugged granite mountains like New England.

The land of Oklahoma possesses a variety of resources which an energetic people, drawn from diverse quarters of our country, are utilizing in the development of a prosperous commonwealth. Although hampered by a late start, today little evidence remains of her recent pioneer condition.

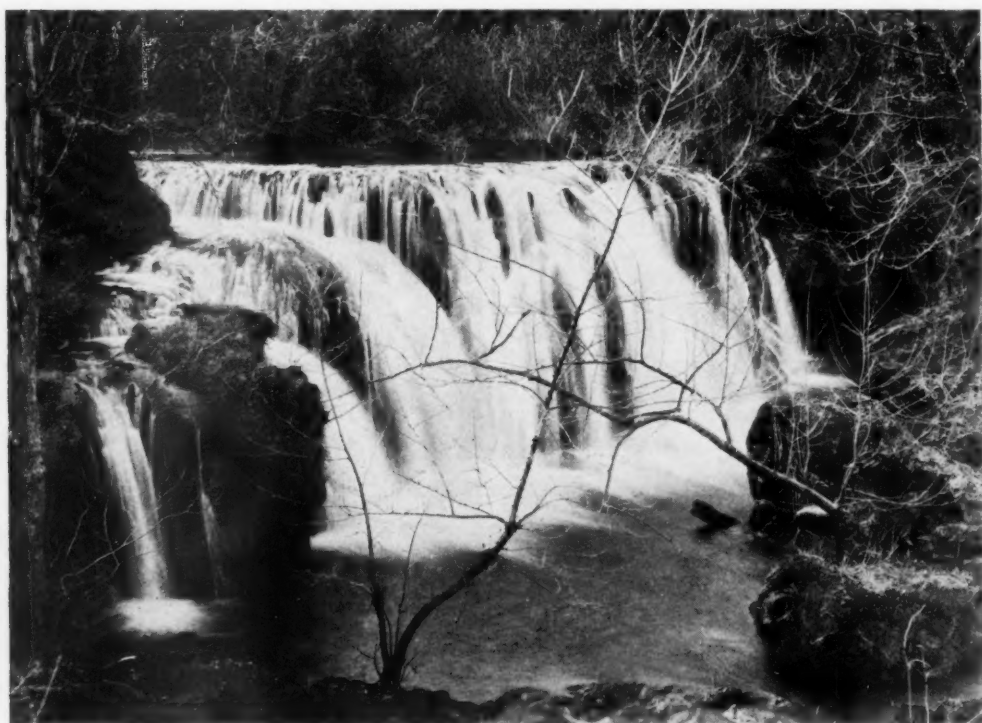


FIGURE 54.—One of the beautiful falls in the Arbuckle Mountains, symbol of Oklahoma's restless energy and power, and her people's vibrant spirit. (Oklahoma Geological Survey.)

## BOOK REVIEWS

TUGWELL, REXFORD GUY; MUNRO, THOMAS, and STRYKER, ROY E. *American Economic Life*. 663 pp. Harcourt, Brace & Co., New York; 1925. \$4.50.

*American Economic Life* was written to serve as one of the texts in an orientation course for freshmen at Columbia College, and was intended to furnish the student with a picture of contemporary economic life in America which would render more intelligible the generalizations and principles set forth in the more advanced courses in the social sciences; in other words, to cover correctly and attractively "the dry bones of economic theory." It attempts to explain the structure and functioning of the important factors in economic life, to describe in considerable detail recent tendencies, and to discuss in a suggestive and cautious manner a multitude of proposed reforms.

It begins with a description of the present levels of living: urban and rural poverty, the comfort level, and the scale of living of the rich. The remainder of the book deals with American institutions and activities as they contribute to the maintenance or the raising of the standards of living.

In Part I of Book II are set forth means for increasing agricultural production, for making rural life more satisfying and beneficial, for increasing the efficiency of urban industry through more effective use of physical science and human energy, for securing better business organization and technique, and for improving the relations of the financial organizations to industry. Part II treats of raising the levels of income through the just apportionment of income; Part III deals with the rationalizing of consumers' spending habits. In Part IV are discussed more comprehensive schemes for reorganization: collective bargaining, the Coöperative Movement, government ownership, and the various brands of socialism. Part V looks with hope toward "Experimental Economics" to solve our economic problems. It appears that "Experimental Economics" is an attitude rather than a new science, the attitude of the unemotional observer who applies "the test of consequences in order to see what program might be best for all people."

The book abounds in information covering a wide range of topics. For example, we find in it tables showing the changes in real wages in the United States since 1820, sources of incomes in the United States, and the relative caloric values of different foods, an outline of world power resources, a description of the factors determining success in farming, the production cycle in the Ford organization, the technique of business forecasting, a fairly comprehensive survey of the organization and workings of the Federal Reserve System, statistics of the growth of coöperative

societies, a description of the structure and growth of the American Federation of Labor.

Special mention should also be made of the authors' generous use of photographs, cartoons, diagrams, charts, tables, and even extracts from works of fiction such as Sinclair Lewis' "Babbitt." A very complete summary in outline form and a good index add to its value as a textbook.

As might be expected in a work so ambitious, the authors quite frequently advance views with which other students will disagree. The view, for example, that the failure of American agriculture to increase yields per acre during the last half-century constitutes a "critical situation" (p. 125), and that agricultural efficiency is superior in Europe because of the more intensive cultivation practiced there (p. 126), will find little support among agricultural economists. European agriculture may be more efficient in the use of land, but it is less efficient than American agriculture in use of labor. The conclusion (p. 593) that 86 per cent of the American people still live in poverty, which is evidently drawn from the statement (p. 97) that 86 per cent of the incomes in 1918 fell below \$2000, is either a gross abuse of the statistics or an unjustifiable use of the term *poverty*. In contrasting the work of the *entrepreneur* whose aim is maximum profits, with that of the engineer, whose aim is maximum production, the authors may be charged by some with failure to give due recognition to the function of the *entrepreneur* in preserving balance and coördination in the workings of the industrial system. The treatment of the subject of the distribution of income (chapter 22) is distinctly less clear than that of more advanced works in the field, and is open to misinterpretation by the immature student who may be suffering from mental astigmatism.

The viewpoint of the book is decidedly optimistic. No gospel of despair is needed in America today where the levels of living "are already the highest ever attained in man's long history. . . . The problems we have are essentially those of making a life, already the best man has ever had, even better" (p. 587). The authors, therefore, criticize those modern American writers, such as Sinclair Lewis and Scott Nearing, who seem influenced by "the gray gloom of English fogs" and "who have entirely overlooked the promises of a rich future beneath the surface ugliness of our industrialism." The solution of the primary problem of poverty the authors find, not in a socialistic or other panacea, but in the solution of a host of secondary problems, large and small, problems of improving the technique of production, securing a juster distribution of income, rationalizing the use of income, and reorganizing institutions gradually and carefully.

The book seems well fitted on the whole for the place for which it was intended. It is not too

elementary for the intelligent college student, and is very much more thorough than certain other works of the type which have recently appeared. Its authors "make no claim to originality or of contribution to economic knowledge or thought," but they have produced a volume which will be useful in bringing in an interesting manner to the attention of the young student a knowledge of modern conditions and problems which will stimulate his interest in the principles of the economic sciences, and prepare him for understanding and evaluating them.

V. ORVAL WATTS.

HOCKETT, HOMER C. *Political and social history of the United States, 1492-1828*, pp. XI, 438. The Macmillan Co., New York, 1925.

SCHLESINGER, ARTHUR MEIER. *Political and social history of the United States, 1829-1925*, pp. XV, 576, The Macmillan Co., New York, 1925.

In this day when college textbooks in American history have become so numerous, it is with a mingled feeling of curiosity and doubt that one takes up a new one. So rapidly have such works poured from the Press in recent years that it seems scarcely credible that anything unique, or distinctive could be said about our history within the limits prescribed by the ordinary textbook. Yet, we are constantly reexamining our history in the light of new interests and new points of view. During the past few years, we have made rapid strides in the exploration of our past from the social point of view, and the time was ripe for a textbook survey which would give adequate attention to these newest contributions of productive scholarship. It is within this field of social history that the two volumes under consideration make their contribution to the textbook literature of American history.

The volume by Professor Hockett gives a clear-cut, readable presentation of the newer interpretations of the colonial, revolutionary, and early national periods, with a nice balance between political, social and economic factors. Taken all in all, however, this volume constitutes a decidedly more conventional treatment than that of Professor Schlesinger's.

The latter emphasizes throughout the fact that democracy and nationalism, the great dynamic forces which were shaping the history of the country in the Nineteenth Century, were not peculiar to the United States; that they were merely the American counterpart of the "current of unrest and revolt which was coursing through the entire Western world"; and that those forces were accelerated in America through the greater mobility of American life, resulting from the presence of the frontier influences.

The author's interest in the social history of the ante-bellum period is attested by chapters entitled: "The Rise of the Common Man," and

"Democracy and Social Reform." His discussion of the social and economic life of the Civil War period and of organized social relief work during the War is the best to be found in any textbook.

It is in the post-Civil War period, however, that the author appears at his best. "The Economic Revolution," to which attention was first called by Professor Beard, receives here its clearest elucidation. In the chapters on, "The Vanishing Frontier and the Agricultural Revolution," and "The Industrial Foundations of the New Nation," the all-pervading influence of the economic transformation of American life is strikingly brought out, and the reader is left with no doubt that every phase of our development during the period was profoundly affected by the change. In short, the growth of industrialism is the key to the history of the last sixty years.

The social history of the time is interestingly treated in the chapters on "Humanitarian Striving and Social Progress," "Alien Peoples," and "The Rise of Organized Labor." Although, in general, the accuracy of the author's statements is praiseworthy, one must take exception when he ascribes to the Period of 1873 the responsibility for the Granger Movement, the "first great farmer's movement in American history" (p. 287).

While the subject content of the book shows a fine sense of discrimination, many will regret that the significance of the Fourteenth Amendment in relation to social legislation does not receive more extended treatment.

In conclusion, it may be fairly stated that, from the standpoint of a well rounded and balanced treatment of our history, the two volumes are superior to any textbook in the field. However, the volume by Professor Hockett fails to reveal the mastery of the colonial field which is displayed in Green's "Foundations of American Nationality," while Professor Schlesinger's contribution lacks the sparkle of Fish's "Development of American Nationality."

JAMES B. HEDGES.

#### U. S. DEPARTMENT OF COMMERCE

Bureau of Foreign and Domestic Commerce

*Turkey: A Commercial and Industrial Handbook*, by G. Bie Ravndal. Trade Promotion Series, No. 28. Price, 75 cents.

Turkey is a land about which it is difficult for the geographer to obtain accurate information. This renders the handbook just issued by the Department of Commerce of unusual value. It contains a description of the country as a whole, and of its separate districts. This includes a survey of mineral resources, agricultural development, commerce, and industry. Illustrations and maps lend point to the text.



*Potash: Significance of Foreign Control and Economic Need of Domestic Development*, by H. M. Hoar. Trade Promotion Series, No. 33. Price, 15 cents.

Potash is one of the three essential fertilizers. Its production for years has been controlled by Germany but with the Treaty of Alsace has come a change. During the war a world-wide search for potash deposits was made which revealed beds in a number of different countries. This interesting and scholarly bulletin traces the history of the potash industry from the beginning, both in its political and industrial relations. In addition it presents the present situation and the possibilities for producing potash in the United States and other countries. Maps show the location of the German potash fields and industries.

*International Trade in Butter and Cheese*, by M. A. Wulfert. Trade Promotion Series, No. 31. Price, 10 cents.

The dairy industry is closely allied to economic and geographic conditions. Trade in dairy products has practically a world-wide extent and the development of the dairy industry in Europe has become highly specialized. This was one of the first industries in Europe to begin reestablishing itself after the close of the war in 1918, so essential are dairy products in the world diet. Though France and Germany are still below pre-war production, many European countries have reached or exceeded their pre-war production of dairy products, and Russia has begun to produce enough dairy products to again have an influence on world markets. In the Southern Hemisphere, New Zealand, Australia, and Argentina, has occurred the largest expansion in the dairy products in recent years. World movement of these products, and conditions attending their production are well analyzed in this bulletin.

*Australia: A Survey of its Resources and Foreign Trade*, by Emmett A. Chapman. Trade Information Bulletin No. 390. Price, 10 cents.

An extremely interesting current and brief survey of present and potential development in Australia.

*Foreign Trade of the United States, in the Calendar Year 1925*. Prepared in the Division of Statistical Research. Trade Information Bulletin, No. 387.

The foreign trade of the United States is becoming an increasingly significant factor in American economic life. The year 1925 was a highly satisfactory one in our foreign trade. The exports of the United States continued their steady advance, exceeding those of 1924 by 7 per cent. In money value they were nearly twice as great as in 1913, and, eliminating the effect of price changes, in the neighborhood of 30 per

cent greater. Our exports of finished manufactures have again risen materially, and almost every class of such articles was exported in 1925 in greater quantity than ever before except that during the two inflation years immediately following the war. This bulletin contains an interesting analysis of the year's foreign trade, detailed statistical tables and well made graphs.

*Trends in Japan's Trade*, by Halleck A. Butts. Trade Information Bulletin No. 389. Price, 10 cents.

Japan underwent a transformation in industry during the war. New markets opened to it and expansion in trade and manufacturing brought increased prosperity to Japan. This situation is analyzed in an interesting manner by Mr. Butts who is now American Trade Commissioner in Tokyo, and knows Japanese conditions thoroughly.

*Peruvian Public Finance*, by Chas. A. McQueen. Trade Promotion Series No. 30. Price, 20 cents.

This is a well considered analysis of Peruvian financial conditions. It contains also a careful study of the historical aspects of Peruvian physical provinces, and a survey of geographic and economic conditions within the republic.

*Currency, Banking, and Finance in China*, by Frederic E. Lee. Trade Promotion Series No. 27. Price, 30 cents.

This field survey of the currency, banking, and financial systems of China is significant and essential to understanding foreign trade problems of the United States and China. The growing importance of economic and trade relations between the United States and China have necessitated this survey. The growing foreign trade of China indicates an increased purchasing power on the part of the Chinese masses, thus making it an increasingly important foreign market. Only meager information is available on Chinese currency and finance, consequently this study is valuable. In addition to a discussion of financial relations it gives a survey of China as a whole and with much worthwhile geographic, as well as economic information. Chinese banks are listed according to provinces, a list of Chinese loans is also included with a description of some special loans.

*The Philippine Cotton-Goods and Hosiery Markets*, by L. M. Lloyd. Trade Information Bulletin No. 392. Price, 10 cents.

The Philippine Islands has today the largest export market for American cotton goods. This bulletin analyzes in an interesting manner the American market conditions in the Philippine Islands and describes the method by which the Philippine embroidery industry is carried on. Running through the text is a description of conditions in the Islands.

*Iron and Steel Trade of the Pacific Area*, by Marshall Teel Jones. Trade Information Bulletin No. 396. Price, 10 cents.

The vast territory bordering the Pacific Ocean is considered by some authorities as the future battle ground of the leading steel producing nations for commercial supremacy in the iron and steel trade. European countries are near the saturation point as regards home consumption and must find markets abroad for their surplus. The United States will always have an available supply for export. India is beginning to produce its own steel. The South American east coast demand is limited. Consequently it is to the Pacific that steel makers must turn when contemplating the probabilities of increasing their foreign turnover. This bulletin contains briefly a survey of market conditions in the Pacific Area.

Other bulletins containing material of geographic interest are:

*Modern Farm Equipment in India.*

*The Uruguayan Market.*

*Caribbean Markets for American Goods.*

*The Balance of International Payments of the United States in 1925.*

*Ice-Making and Cold-Storage Plants in Continental Europe.*

*Machinery Markets of Netherlands East Indies.*

*Motor-Bus Transportation, Part I—Europe.*

*Motor-Bus Transportation, Part II—Canada and Latin America.*

HELEN M. STRONG.

ANDREE, KARL. *Geographie des Welthandels. Europa*, Volume 1, xx and 1178 pp. L. W. Seidel & Sohn, Wien, 1926. 10 x 7 inches. Price unbound F. 9.00; bound in cloth F. 10.00; bound in leather F. 11.50.

The fourth and revised edition of this monumental work is now appearing from the press, the first volume on Europe having been issued and distributed. Without disparagement of the first and other editions, it is no exaggeration to state that this fourth edition excels them all in comprehensiveness of fact, authority of statement, logic of interpretation, and exhaustive treatment.

Dr. Franz Heiderich, of the Hochschule für Welthandel in Vienna, has written the general survey of Middle Europe; Dr. Hugo Hassinger of the University of Basel, The German Empire and Austria; Dr. Adolf E. Forster, Switzerland; Dr. Herman Leiter, also of the Hochschule für Welthandel in Vienna, Czechoslovakia; Dr. Arved Shultz, of the University of Königsberg, Poland; Dr. Randolph Rungaldier, also of the Hochschule für Welthandel in Vienna, Hungary; Heinrich Wachner, of the Honterus Gymnasium in Kronstadt, Rumania; and Dr. Carl Patsch of Vienna, Yugoslavia and Bulgaria.

Dr. Robert Sieger has written the general survey of West Europe; Dr. Walther Vogel of Berlin, France; Dr. Walther Tuckermann of Mannheim,

Belgium and Holland, and Dr. Erich Obst, of Hanover, Great Britain and Ireland.

Dr. Norbert Krebs of Freiburg i. B. has written the general survey of South Europe and Italy; Dr. Otto Quelle of Bonn, the Iberian Peninsula; Dr. Carl Patsch, Albania and European Turkey; and Dr. Otto Maull, of Frankfurt a. M., Greece.

Dr. Robert Sieger of Graz has written the general survey of Baltic and Northern Europe, and Denmark, Sweden, Norway, and Finland; Dr. Hans Mortensen of Göttingen, Estonia, Latvia and Lithuania; and Dr. Friedrich Immanuel of Marburg, Russia.

The galaxy of brilliant men who have associated themselves in this painstaking work of revision could not be surpassed for scholarly attainment or mastery of their subject, elsewhere in the world. Their eminence in geography guarantees the high character of the work and the trustworthiness of the subject matter.

This exceedingly valuable work is of utmost importance to every student of geography, every exporter and importer, every student of world affairs. As a final reference in commercial and economic geography, it should be included in every university and college library in the country, as well as in every industrial library.

W. ELMER EKBLAW.

BRANN, GUSTAV. *Die Nordischen Staaten: Norwegen, Schweden, Finnland*. 140 pp., maps, charts, and illustrations. Ferdinand Hirt, Breslau, 1924.

One of the most interesting geographic publications of the year is this concise, but thorough, regional study of the three northern Scandinavian countries from a sociologic point of view. It is a lucid interpretation of the relation between physical conditions and the economic and social organization of the peoples of these northern lands, fluently written and easy of reading.

Upon a solid foundation of physical factors, the author rears his pleasing façade of sociologic and economic relationships, that represents Norway, Sweden and Finland as the very finest examples of modern civilization. He presents this volume as a study in method. Without accepting or rejecting his plan, or his argument, the student of geography may learn a great deal by a careful study of this volume of Brann's.

The value of the work is enhanced by the compact tables, the pertinent illustrations, and the well-selected bibliography included with the text. The volume is well worth a place on the shelf of any library.

W. ELMER EKBLAW.

LAGRELIUS, AXEL. *Våra Kartor*. 139 and xxxii pp.; maps, charts, sketches. Generalstabens Litografiska Auktalts Förlag, Stockholm, 1926.

This admirable little treatise on the maps of Sweden is a model that might well be followed by the several countries of the world producing series

of maps; their maps would be made more accessible and so more valuable by similar summaries.

Cartography has made great progress and achieved a superb technique in Sweden. Sweden's maps are among the finest in the world, justly renowned for their scholarly composition and their artistic handicraft. Few lands are so thoroughly mapped as is Sweden, few so proud of their maps.

In this little volume a brief history of map-making in Sweden is followed by compact, catalogued descriptions of the various types of maps, a full explanation of all figures used, and a complete index. Every geographic library should possess a copy of this valuable book.

W. ELMER EKBLAW.

JONES, WILLIAM R. *Tin Fields of the World*. XII and 423 pp., ill., diagrams, maps, bibliography, index. Mining Publications, Limited, London, 1925.

*Tin Fields of the World*, by W. R. Jones, is a timely contribution. It has been more than a score of years since a book of this nature was published, during which time the output and consumption of tin has increased about 50,000 tons or 60 per cent. At that time Bolivia was only beginning to develop as a producer of tin, also some of the minor deposits of Africa and Asia were not yet listed, while some of the mines that were of importance then have been depleted.

The book falls naturally into two parts. The first five chapters introduce the reader to the metal by giving briefly the properties, uses of the metal and certain statistics, a discussion of the tin smelting of the world, a short statement of the methods of marketing tin ores and concentrates, also a good discussion of the origin and mode of occurrence of tin minerals, and a very fine description of tin mining methods.

The five chapters of the second part of the book are devoted to a description of the various deposits of the world, one each being given to the deposits of the continents of Europe, Asia, Africa, the Americas, and Australia.

The deposits of Europe, for centuries the chief source of supply of world tin, are almost exhausted and only accounted for 2.38 per cent of the world's tin in 1924. However, the United Kingdom has political control of 45 per cent of the mines, commercial control of 75 per cent, and controls more than 55 per cent of tin smelting capacity of the world.

The mines of southern Asia and adjacent islands have accounted for the last half century for the

bulk of the tin used throughout the world. In 1924 they yielded 68 per cent of the world's output. However, these alluvial deposits are being rapidly mined and within the next decade or two the major deposits will have been exhausted.

The whole of the continent of Africa produced only 5.47 per cent of the world's output of tin in 1924. Most of this came from Nigeria, a region yielding tin in appreciable amounts only during the last score of years. With improved methods of mining and transportation and a high remuneration to cover the cost of exploitation, the tin output of Africa may assume a greater relative importance as a world producer of tin than she holds at present.

Tin production in the Americas is relegated almost wholly to South America, yet North America consumes more than half of the world's output. In 1924 the output was 21.04 per cent of the world's production, almost all of which came from Bolivia. In contrast to the Netherlands East Indies, Bolivia has a central location, she is cut off from the sea by high mountain barriers, has no navigable streams on which to float out the ore, and the lode tin deposits lie high up on the sides of steep valley walls and are reached only with difficulty. All incoming supplies and outgoing metals must bear the cost of llama, mule-wagon, or automobile transportation across plateaus and over mountain ranges.

Australia's output in 1924 was 1.8 per cent of the world's output and it is least important of all continents from the standpoint of production. Many of the deposits have been worked out, yet others may be discovered as prospecting goes on more thoroughly and definitely. However, it is rather difficult to determine the future relative importance of Australia as a source of tin.

The last chapter of twenty-seven pages is given over to a well selected, carefully organized regional bibliography of all the tin districts of the world. Well chosen illustrations and a comprehensive index aid materially in opening up this mine of information on tin.

For all who are interested in the tin industry or concerned about the reserves of tin, and for students and teachers of economic geography, this book will afford valuable materials. It presents a wealth of comprehensive information that is not available in most libraries of America. It is a splendid book of statistical material, descriptions and details of the tin regions of the world, based in part upon the author's fourteen years' experience as a mining geologist on the tin fields of Asia and Europe.

HARLEY P. MILSTEAD.

## OUR CONTEMPORARIES

### THE GEOGRAPHICAL REVIEW

Vol. XVI, No. 2. April, 1926

- A Frontier Region in Brazil, Southwestern Maranhão.** 18 pages. E. W. Shaw and J. L. Darnell, Jr.

Detailed and interesting observations, the result of a recent expedition into a part of Brazil which promises future economic development.

- The Aroostook Valley: A Study in Potatoes.** 9 pages. Ella M. Wilson.

An excellent economic study of a highly specialized type of agriculture.

- In the Northwest of the Australian Desert.** 25 pages. Frederick G. Clapp.

Mr. Clapp adds to our knowledge of a remote region of a remote continent. The land, its people and the economic possibilities are well treated.

- The Delta and Estuary of the Colorado River.** 23 pages. Godfrey Sykes.

The Colorado River, "the greatest undeveloped asset of the Southwest," is beginning to command the attention of the nation. The rapid physiographic changes which have characterized the lower course of the river during the past century are treated by Mr. Sykes.

- The University of Michigan Greenland Expedition of 1926-1927.** 7 pages. William Albert Hobbs.

Observations of meteorological conditions, the Greenland ice cap and the iceberg problem of the North Atlantic should yield valuable results.

- Early Maps of Carolina.** 9 pages. Worthington Chauncey Ford.

An article of interest to the historian of the South Atlantic Coast.

- Climatic Pulsations During Historic Time in China.** 8 pages. Co Ching Chu.

The author presents climatic data of significance in the geographic interpretation of some phases of Chinese history.

- A Dot Map of the Distribution of Population in Japan.** 2 pages. Wesley Coulter.

A valuable map, well executed.

- A New Map of World Rainfall.** 5 pages. Mark Jefferson.

The most recent data are employed in the preparation of this excellent map.

- Ocean Trade Routes.** 4 pages. E. S. Gregg.

Valuable summary and striking maps of present-day ocean routes in terms of comparative tonnage.

- An Abrupt Change of Depth in the Sulu Sea.** 3 pages. F. H. Hardy.

- Report and Publications of the American Geographical Society.**

**Geographical Record.**

**Geographical Reviews.**

### THE BULLETIN OF THE GEOGRAPHICAL SOCIETY OF PHILADELPHIA

Vol. XIV, No. 2. April, 1926

- A Hilltop on the Susquehanna.** 11 pages. Malcolm H. Bissell.

Reconstructed landscapes of successive geologic ages as viewed through the imagination from "a hilltop on the Susquehanna." Artistically portrayed.

- Early Uses of Land in Rhode Island.** 17 pages. Eric P. Jackson.

Historical treatment of the changes in land utilization in Rhode Island as affected by geographic factors.



**Tramping Along the Viking Trail.** 7 pages. Fullerton Waldo.

Observations made in Greenland along the trail of Leif the Lucky. Vividly recounted.

**The Rangeley Lakes Region of Western Maine.** 4 pages. Lindley Johnson, Jr.

**Book Reviews.**

**Geographic News and Notes.**

**Activities of the Society.**

#### THE JOURNAL OF GEOGRAPHY

Vol. XXV, No. 3. March, 1926

**Some Tendencies in Elementary Education and Their Possible Effect on Geography.**

8 pages. A. E. Parkins.

**What is Social Geography.** 6 pages. C. C. Huntington.

**Fresh Air and Sunshine.** 3 pages. O. D. Von Engeln.

**African Trade.** 8 pages. H. K. W. Kumm.

The potential resources of Africa and the growing importance of its trade.

**Contemporary South Africa.** 8 pages. Stephen G. Rich.

An up-to-date interpretation of South Africa. Significant facts for the teacher.

**Picturesque America: Its Parks and Playgrounds.**

**Geographical Publications.**

#### THE JOURNAL OF GEOGRAPHY

Vol. XXV, No. 4. April, 1926

**The Blue Grass Region of Kentucky.** 15 pages. D. H. Davis.

A regional treatment of a geographic area, historically and economically well-defined.

**The Selection of Geographical Material for Junior High Schools.** 7 pages. E. E. Lackey.

**Reflections on the Teaching of Geography.** 2 pages. W. S. Dakin.

**Human Geography of British Guiana.** 6 pages. Olive Gillham.

Conclusions interesting; method suggestive.

**Columbia Sends an S. O. S.** 4 pages. Ruby A. Henry.

**A Study of Siberia.** 2 pages. Alice Bundy.

**Geographical Notes.**

**Geographical Publications.**

#### THE JOURNAL OF GEOGRAPHY

Vol. XXV, No. 5. May, 1926

**Geography and the Social Sciences.** 7 pages. Mendel E. Branom.

**The Necessity of Accurate Knowledge About Places.** 7 pages. Douglas C. Ridgley.

A sound discussion of a fundamental geographic problem.

**The Human Significance of Maturity of a Plains Region.** 5 pages. Roderick Peattie.

**Reflections on the Teaching of Geography.**

II. The Place of History in Evaluating Geographic Influences. 8 pages. W. S. Dakin.

**Summer Courses in Geography.**

**State Council News.**

**Geographical News.**

## THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XLIX, No. 3. March, 1926

**Singapore, Crossroads of the East.** 34 pages. Frederick Simpich.  
Text and illustrations describe this Oriental focus of world commerce.

**The Land of Egypt.** 27 pages. Alfred Pearce Dennis.  
Modern agricultural development along the fruitful Nile.

**A Naturalist with MacMillan in the Arctic.** 19 pages. Walter N. Koelz.  
Life of the people of Greenland beautifully depicted in color.

**Transylvania and Its Seven Castles.** 33 pages. J. Theodore Marriner.  
The romance of Transylvania's life and country side.

## THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XLIX, No. 4. April, 1926

**Exploring the Valley of the Amazon in a Hydroplane.** 67 pages. Capt. Albert W. Stevens.  
Remarkable views from the air of the Amazon River and forest.

**Marvels of Mycetozoa.** 22 pages. William Crowder.

**The Amazon, Father of Waters.** 18 pages. W. L. Schurz.

**Where the Sard Holds Sway.** 10 pages. Colonel Luigi Pellerano.

## THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XLIX, No. 5, May, 1926

**Motor-Coaching Through North Carolina.** 52 pages. Melville Carter.

**The Ashley River and Its Gardens.** 26 pages. E. T. H. Shaffer.

**London from a Bus Top.** 45 pages. Herbert Cory.

## THE JOURNAL OF LAND AND PUBLIC UTILITY ECONOMICS

Vol. II, No. 2. April, 1926

**A Study of the Motor-Bus as a Competitor of the Railroads.** 26 pages. J. E. Slater.

**The Fairway Farm Project.** 15 pages. M. L. Wilson.

**The City Housing Corporation and "Sunnyside."** 13 pages. Richard T. Ely.

**Improvements in the Mechanism of Public Utility Valuation.** 11 pages. William L. Ransom.

**The Problem of the Origin of Serfdom in the Roman Empire.** 9 pages. Michael Rostovtzeff.

**Rent and Interest as Shares in the Product of Enterprise.** 8 pages. Willford I. King.

**A Study of Utility Financial Structures: Scope and Method.** 6 pages. A. E. Patton and O. Gressens.

**Where Drainage Pays.** 7 pages. E. R. Jones.  
A valuable and timely presentation of drainage policies of Wisconsin.

**Public Utility Financing: A Review of 1925.** 7 pages. Herbert B. Doran.

**Department Contents.**

**Book Reviews.**

**Summaries of Research.**

**Comments on Legislation and Court Decisions.**

## ANNOUNCEMENT

THE series of articles *Agricultural Regions of the World* will be resumed in the October issue with the first instalment of *Agricultural Regions of North America*, by Dr. O. E. Baker of the United States Bureau of Agricultural Economics. It will be illustrated by an excellent colored map and many maps in black and white, presenting the latest agricultural data available. This superb article will be continued in later issues, when another up-to-date colored map will be presented with the final textual material. This series will comprise one of the best popular, thoroughly scientific, presentations of North American agricultural geography in print.

*Agricultural Regions of South America*, by Clarence F. Jones; *of Africa*, by Homer L. Shantz; *of Australia*, by Griffith Taylor; and *of Asia*, by Olof Jonasson, will follow in later issues.

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